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ABSTRACT

This documents consists of articles on hypermedia and multimedia use in education. Article titles include: (1) Teaching HyperStudio Multimedia (Thomas A. Drazdowski); (2) PowerPoint '97 as an Authoring Tool (George K. Fornshell); (3) Ten Web Sites for Educators (Trudy Abramson); (4) Bloodbourne Pathogens Training Program (Vernon Czelusniak); (5) Security in the Telelearning Environment (Marlyn K. Littman); (6) French Immersion Content Taught via the Internet (Michelle Haj-Broussard and Alex Rath); (7) The Wonderful World of Time (Bart Hoffman); and (8) A Lesson Plan for Integrating Technology with Social Studies and Language Arts, Grade 5 (Linda Aubry). Additional articles include: (1) Integrating the Internet in the Elementary Classroom (Kevin Andreyo); and (2) A Model for Teaching Multimedia Computer Applications in Preservice Teacher Education (Gregory MacKinnon). Columns include editorials; messages from the Chair of the HyperSIG Board of Directors; and courseware, report, and book reviews. (AEF)

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Gertrude W. Abramson , Editor

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HyperNexus

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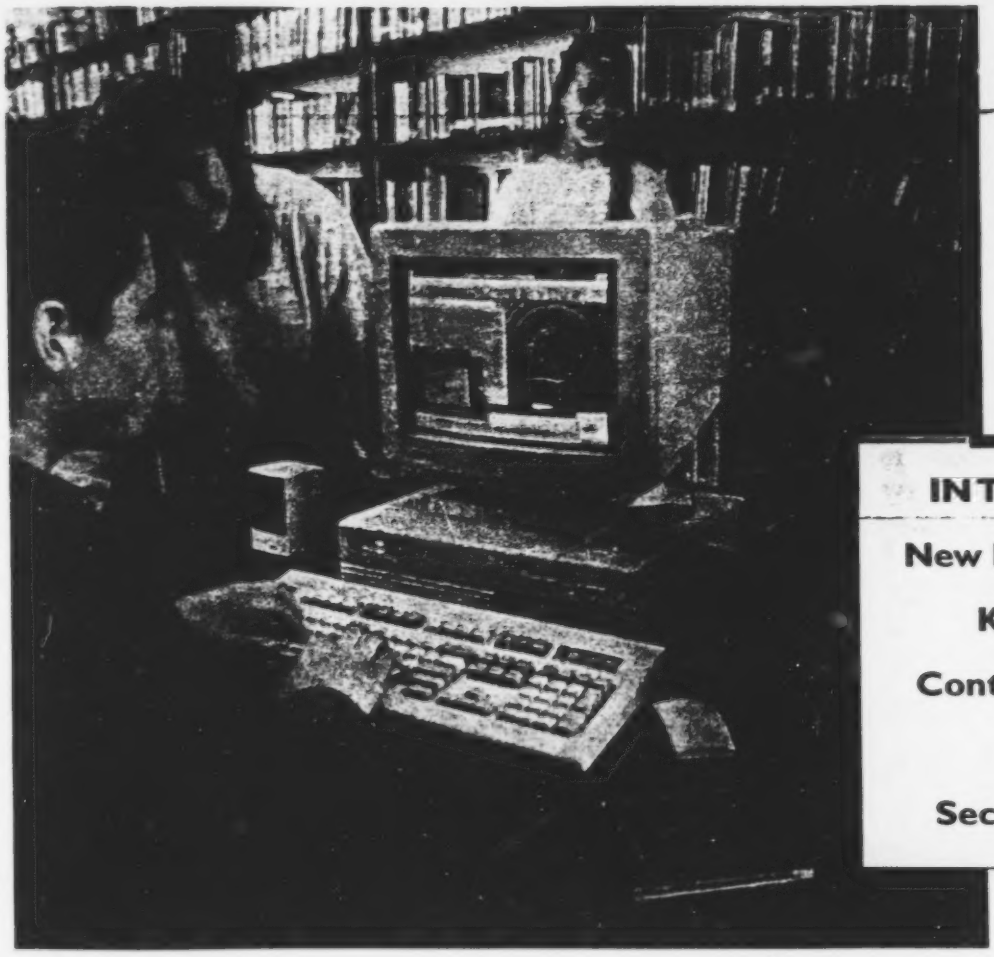

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Contest Winners

ISD

Security Issues

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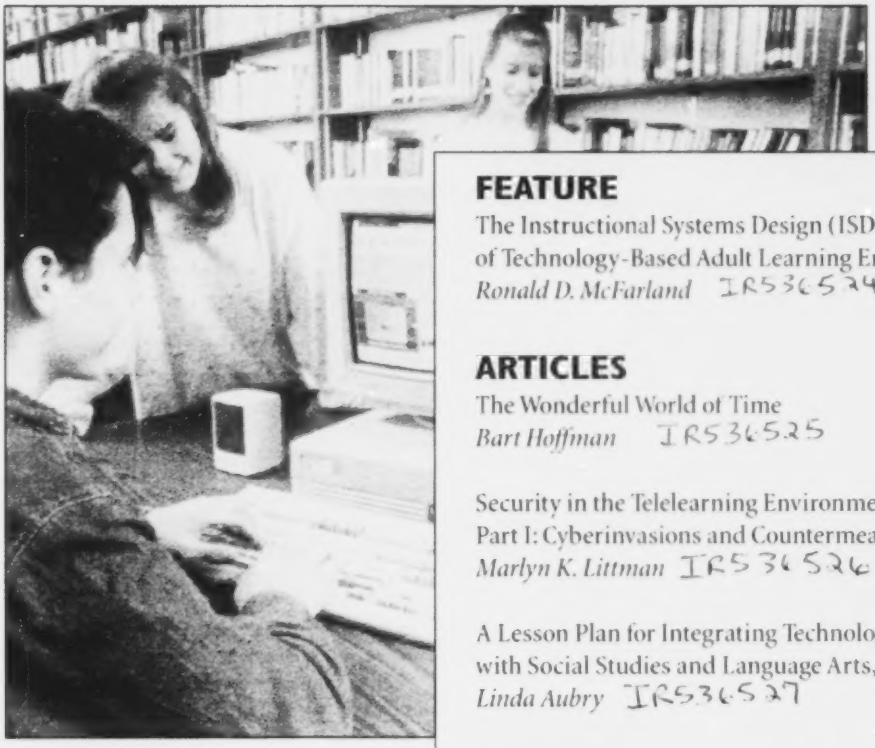

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EXEMPLARY INTERACTIVE SOFTWARE

TRUDY ABRAMSON

AT NECC '96, THE EDITORS AND directors of HyperSIG determined that one way to extend our outreach to teachers would be to conduct a software development contest. It was hoped the teacher- and student-developed products, across the grades and disciplines, would provide models of authored products that showed new ways to develop projects and master curricula. A contest was set up with six categories: student-developed software in grades K-5, 6-12, and post-secondary, and the same breakdowns for teacher-developed materials. The contest was announced briefly in volume 7 number 1 and described fully in volume 7 number 2.

The call for participation evoked many phone calls and e-mail inquiries. However, entries were received in only two categories: student-developed products by sixth graders and teacher-developed products, all post-secondary. The judges, editor-in-chief Trudy Abramson and consulting editors George Fornshell and Marlyn Littman, carefully evaluated the submissions and selected six winners. The software was displayed at the HyperSIG meeting at NECC '97, where winning teams and individuals were presented with award certificates and $100 honoraria. Excerpts from the winning entries are featured in this volume. The projects are described below.

Bloodborne Pathogens Training Program

Vernon L. Czelusniak, a trainer at Coulter Corporation in Florida, created an interactive training program for employees of a bio-medical corporation who handle blood products as part of their jobs. The content for the product came largely from OSHA requirements and was tailored to meet the needs of his employer. The product uses the metaphor of a school with dedicated classrooms, is visually attractive, and has self-testing materials interspersed throughout the training process. The entry, a Windows product, was submitted on 10 high-density disks.

Visualizing the Third Dimension

Jeffrey J. Silverman teaches drafting courses at Keiser College, a private, two-year, post-secondary institution in Florida. He created an interactive, dynamic product to help his students visualize the complexity of three-dimensional drafting and to improve their spatial reasoning powers. Pictorial and isometric drawings present the migration of drafting from 2-D to 3-D standards. The metaphor is a computerized drafting table and the products created therein. This Windows product was submitted on CD-ROM.

Telling Time

Bart Hoffman teaches gifted and talented students in the Keppel Union School District in California. Working cooperatively under his direction at Pearblossom Elementary, sixth graders Marisa Ramirez, Alexandra Gregory, Gina Dell'Acqua, and Kelly Waldman developed a software product for first-grade students at their school. This Macintosh product, contained on two disks, is a tutorial for learning to tell time on an analog clock. The metaphor is the traditional, round clock-face. The digitally reproduced children's voices, coupled with the plan and implementation of the product, are truly delightful.

Nursing Care for a Patient in Traction

Barbara Mottola, associate professor of nursing, and Maryann Pionegro, director of academic computing, both at Atlantic Community College in New Jersey, worked as principals on a community college-based multimedia team that developed a software tutorial to teach associate degree nursing students a specific area of their training. This entry was the most professional of the submissions. The judges felt that the product could compete successfully

with marketed software. In addition to necessary content material presentation, the software provides just-in-time guidance in caring for a patient in traction. This Windows product was submitted on CD-ROM.

Graphs and Networks: Concepts and Implementation

Thomas E. Beutel, associate professor of computer science at Mount Vernon Nazarene College in Ohio, created an interactive product to help his students define terms, explain concepts, and implement graph and network data structures and algorithms. This software is used in conjunction with classroom instruction and assignments. The metaphor is a computer lab highlighted with animated demonstrations and dynamic development opportunities. The product runs through DOS (PC) and is contained on a single, high-density disk.

The Legacy of Egypt

Adrian Geszler, a computer education teacher at Woodbury Elementary in Ohio, guided sixth graders Ed Cormany, Ping D'Souza, and Brian Sutorius on their collaborative software creation on CD-ROM as a culminating social studies experience. This professional-looking, research-oriented team product is precisely the type of entry the editors and directors keep requesting for publication in HyperNexus. It is a real-life example of using the tools of today in an authentic assessment-learning experience. The product was submitted for use with Macintosh computers.

IN THIS ISSUE

We are pleased that this issue covers a wide spectrum of interests, including illustrated essays created by sixth graders, articles that enhance life-long learning, and a book review that opens many doors of creativity.

Paola Williams, who continues as HyperSIG chair par-excellence, writes about changing the focus in teacher education workshops from "technology learning" to "improving teaching and learning."

Ronald D. McFarland, a professor of instructional technology, discusses the importance of using an Instructional System Design (ISD) model during the creation of technology-based learning models. This work focuses on the needs of the adult learner. Because of the article's length, part one is published in this issue with the complete reference list. Part two will appear next issue.

Bart Hoffman, a technology teacher who works with gifted and talented students in California, presents one of our contest winners. The work, developed by the students named above, was created specifically for use by first graders who are learning to tell time. The thought, organization, attention to detail, and industry involved in the product's development are exemplary. *HyperNexus* congratulates Pearblossom Elementary for creating this model and for sharing it with us.

Marlyn K. Littman, a professor of telecommunications and many other technology-related issues, addresses a key issue in the development of online learning environments: security. Part I: Cyberinvasions and Countermeasures is published here. A second part will appear in volume 8 number 2.

Linda Aubry, a technology specialist whose letter was featured in our last issue, contributes a lesson plan that uses technology to enhance fifth-grade social studies. Examples of student work are appended to the lesson.

Kevin Andreyo, who performs extensive teacher training in the use of technology, reviews a book that describes multimedia projects across the grades. *HyperNexus* is pleased to welcome Kevin as our newest member of the editorial board.

NEWS AND NOTES

As noted in volume 7 issue 4, each article now has a list of identifying keywords. The editors trust that this is one more step forward in the professionalization of our journal.

Omission to Index, *HyperNexus* Volume 7: Under the heading Hypermedia/Hypertext: Janowiak, Kenneth. . . . . Using Scripts in LinkWay. . . . . Number 4 page 8. Our apologies to Ken.

We hope that by presenting a wide range of member work, we will inspire an increasing number of contributions to *HyperNexus*.

ASKING 'WHY TECHNOLOGY?'

PAOLA WILLIAMS

ONE OF THE GOALS OF THE *HyperNexus* journal is to provide educators with opportunities to find relevant information in their field pertaining to the role of technology in teaching and learning.

There is currently much discussion about the topics of teacher training, in-service, and professional development in the area of technology acquisition, so much so that every other weekend is taken up with a workshop, conference, or speaker. Additional time is spent at in-service trainings before and after school. The 8,000 people who attended NECC '97 in Seattle serve as a testimonial to this!

What has struck me most is the nature of these types of trainings, many of which begin with a questionable assumption and focus on one particular aspect of technology. The assumption is that technology should in fact be used by all teachers in the same way, and that they had better learn the new hot "thing" to do to be cool. (Is it still Java scripting?)

Otherwise, why would you be at this workshop? We never ask the question, "Why technology?" nor do we wait for a response. The focus on teacher training in technology has been primarily application-driven. That is to say, a teacher will learn to use a multimedia tool, a word processing program, a spreadsheet application, or a Web authoring software (presumably with a Java scripting scrolling across the screen!).

Teachers will learn to "surf the Web," join a list, and send e-mail, but hardly any thought is given to the context in which these tools will be used. We may discuss social studies, math, English, or science, but only in regard to "great Web pages out there" or lesson plans to copy. We do not start from the point of learning and teaching in the context of a subject or discipline. We start learning "about" technology by using the "computer application" approach.

I had the opportunity this summer to work with a team who employed a shift in the thinking of what constituted a teacher/facilitator workshop in technology. We called it "Portfolio of Possibilities," and the reason for the title was simple. We wanted our participants to leave with an open-minded attitude about what was possible using technology to enhance learning for all students while improving teachers' classroom skills. Lofty ideas for a one-week workshop!

You can imagine the reaction the first week from our 15 participants—all adults, teachers, administrators, and facilitators—when we started our workshop with a simple question: Why technology? The idea was to have our participants look outside "the box" and examine the motives behind technology in their schools, and how they would present their sales pitch to their school district or complex. The question thus became, "Why are you doing this?" Once the participants got into their roles, a lively discussion ensued. Many attendees thought they would use this same activity with their own faculty, staff, and administrators to help them focus.

We divided the five days into themes. On the day we discussed the theme of tools, we used small and large group activities to help us generate a common list of the best teaching and learning practices. The idea of the "ah-ha" experience for students was discussed at great length. Questions arose, such as: What was happening to students when learning really took place? How do we replicate it for all students? Can technology facilitate this occurrence?

This brainstorming led us into a discussion about computer activities. We looked at technology tools as collections of information, virtual communities, and multimedia tools. Along with our discussions and real-time computer experiences, we did a great deal of reading outside the workshop—homework—by putting together an extensive collection of readings for all the themes. Many of the readings where just there if a participant

wanted more information, while others were required. What was unique about the selection of reading materials was its wide range of opinions and visions. From John Perry Barlow's *It's a Poor Workman Who Blames His Tools* to Todd Oppenheimer's article titled "The Computer Delusion" in the July *Atlantic Monthly*, we tried to provide both the argument from the evangelist point of view to the Luddite's perspective, so that our participants would be able to formulate their own reasoning about "why technology?"

This was one experience in trying to provide a different kind of in-service training. It is not to belittle hands-on application training; however, it is to suggest that there needs to be a reason why we believe that using technology in the classroom might change the culture of school, and then prepare our teachers and students to be successful at using it to improve their teaching and learning.

I retell this experience as an invitiation to all *HyperNexus* readers to join in the conversation and write from their own experiences in learning and teaching. Think about, and then act upon, publishing your work in *HyperNexus*. HN

Paola Williams is president of HyperSIG and teaches at Punahou School, Honolulu, HI; pwilliams@lava.net.

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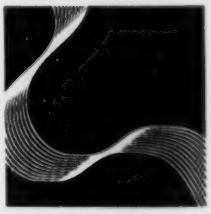

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The Instructional Systems Design Model in the Design of Technology-Based Adult Learning Environments

RONALD D. McFARLAND

KEYWORDS:
Instructional Systems Design, Adult Learning, Presentation Methods

THIS PAPER DISCUSSES THE importance of using the Instructional Systems Design (ISD) method to design the presentation and content for a technology-based learning (TBL) environment, specifically as it relates to the adult learner. First, technology-based learning environments are described along with various terms used in the field, such as multimedia, computer-based training, and computer-assisted instruction. Second, the extensive use of TBL in university and adult-learning environments is discussed. Third, the six most common presentation methods are explained, because each presentation approach has an effect on the development of computer-mediated instruction. Finally, an ISD model and its five phases are explained.

Technology-based Learning Environments

With the multiplicity of vocabulary terms and acronyms used in the computer education field, terminology can become somewhat confusing. "Multimedia" and "technology-based learning" are commonly viewed as higher-level contexts that encompass several subordinate definitions. Multimedia is the combination of text, graphics, sound, animation, video, or other media into a product or presentation on the computer that may not necessarily be used for instruction (Apple, 1994). Technology-based learning (TBL) is a term often associated with all forms of computer use in support of learning that encompasses computer-assisted instruction, computer-based instruction, computer-based learning, and computer-based training (Reynolds & Iwinski, 1996). Ron Anderson (Anderson & Veljkov, 1990, p. 16) said TBL has a "lexicon replete with jargon and acronyms apparently designed to baffle all but the initiated." Several acronyms related to TBL are defined below:

1. Computer-Based Instruction (CBI) is used frequently to "imply only educational uses of the computer where the computer is delivering the information to the student" (Simonson & Thompson, 1994) (p. 133).
2. Computer-Based Learning (CBL) is considered more general because the term "learning" more naturally encompasses many situations where the computer is used as an educational tool (Simonson & Thompson, 1994).
3. Computer-Managed Instruction (CMI) is the aspect of TBL that includes testing, prescription generation, and record-keeping modes (Reynolds & Iwinski, 1996).
4. Computer-Aided Education (CAE) comprises hardware and software systems that exploit computer technology to assist educators and students in improving learning productivity (Simonson & Thompson, 1994).
5. Intelligent Computer-Assisted Instruction (ICAI) adds elements of artificial intelligence and expert systems to Computer-based training. ICAI infers from the student's actions his or her goals, characteristics, and current knowledge. It then tailors instruction and feedback to fit these plans and to correct the student's misconceptions (Horton, 1994).
6. Computer-Based Training (CBT) is broadly defined as all forms of computer use in the support of training and learning (Horton, 1994). The meaning is identical to Computer-based learning (CBL) but is preferred by some users with a training focus (Reynolds & Iwinski, 1996).
7. Computer-Assisted Instruction (CAI), a term used throughout this investigation, refers broadly to all educational software. It usually means a programmed learning ap-

proach in which specific educational objectives are achieved through step-by-step instruction (Simonson & Thompson, 1994). CAI is the use of a computer to interact directly with the student for presenting lesson content using drill and practice, tutorial, and simulation presentation modes (Reynolds & Iwinski, 1996). Additionally, Reynolds and Iwinski (1996) noted that CAI is generally integrated with elements of hypertext. In this investigation, CAI refers to the construction and testing of a presentation for adult learners.

Falk and Carlson (1995) described the key attribute in CAI learning as it relates to a cybernetic process. The process-oriented concept of cybernetics implies a control stimulus communicated to a programmed system, the resultant system status modification, and the feedback that describes a new state of the system. Instruction can be viewed as a process in which information is transmitted, a feedback is elicited, and an analysis of the feedback is made that governs the further transmission of information. Further, a prescription for instruction can be developed that will include each of these actions and be specific to an individual sequence of instruction, such as integration of learning theory, specific application requirements, available technology, learner profiles, and terminal educational or training objectives. Butler and Clouse (1996) pointed out that the efficacy of computer-based educational materials is contingent on a clear design strategy that supports the cognitive process.

The Extensive Use of Technology-Based Learning in Adult Education

Technology-based learning is used extensively in education (Falk & Carlson, 1995). Hofstetter (1995) described how the prolific growth in multimedia during the late 1980s and early 1990s has proved so effective in education that the states of California and Texas have adopted videodiscs instead of textbooks and invested their budgets in technology-based learning instead of traditional educational materials. Fulton (1993) reported two different studies by the U.S. Congressional Office of Technology Assessment (OTA) regarding the extensive use of Information Technology (IT) in education. Gagne, Briggs, and Wager (1992) defined IT as the practical procedures for using existing communications and media to deliver instruction or portions of instruction that supplement the interaction betw

As a further indication of the expansion of IT in the university environment, Chen and Brown (1994) reported the survey results from the University of Connecticut School of Education's IBM Teacher Preparation Program. This integrated bachelor's and master's program showed almost 95% of the learners had taken courses that involved computers in the classroom. Gagne, Briggs, and Wager (1992) referred to the spread of technology as the "proliferation" of IT in the university environment. Ashley (1992) reported an example of the delivery of university degree courses to the adult learner using IT. The University of Phoenix's online campus in San Francisco, California, graduated its first class of Master of Business Administration (MBA) students in 1992. These students earned their degrees through distance education with the use of computers, the Internet, and other telecommunications modes (Ashley, 1992).

In summary, as noted by Abramson (1993), "This is the beginning of the decade in which technology-supported learning will become ubiquitous and effective" (p. 8). Abramson (1992) further stated that, "The prevalence of computers in society, combined with the drop in the cost of computers and the proliferation of new and better software, is rapidly changing the situation to one in which every classroom teacher will be responsible for using computing in the learning process" (p. 3). Vaughn and Thuente (1995) pointed out that colleges and universities are the most needy destination for multimedia and discussed the utilization of CAI with the adult learner. Further, they stated that CAI will provoke radical changes in the teaching process in the coming decades, particularly as learners discover they can go beyond the limits of traditional teaching methods.

PRESENTATION METHODS

To support the various learning styles, presentation for instructional media has been categorized into six general design approaches (Heinich, Molenda, & Russell, 1994). Each approach is not mutually exclusive; typically, developers will blend two or more methods for presenting topical material when developing CAI (Marshall & Shipman, 1995). The six presentation methods are:

1. *Drill and Practice.* Heinich et al. (1994) defined drill and practice as a method where the learner is led through a series of practice exercises designed to increase fluency in a new skill or to refresh an existing ability. Behaviorist theories are best exemplified in "drill-and-practice" software that allows students to practice and memorize small amounts of information (Reese, 1994). In drill and practice, a concept is presented and the user is repeatedly questioned on it. If the user misses the question, an explanation or hint is given and another question is presented. This cycle is repeated until the learner has clearly memorized the concept (Horton, 1994).

2. *Tutorial.* This design approach is usually used as a supplement to either classroom or textbook course work (McKnight, Dillon, & Richardson, 1993). It is a stand-alone instructional process and combines a mixture of teaching, practice, and evaluation modes (Kaiser, 1991). Kaiser (1991) further stated that a tutorial covers material that is often learned better in a one-to-one setting. In general, a tutorial is an individualized course that guides the student through learning of a particular subject area. The program teaches the concepts and rules of a subject area and evaluates the student's comprehension. A tutorial presents the content, poses a question or a problem, requests a learner response, analyzes the response, supplies appropriate feedback, and provides practice until the learner demonstrates a predetermined level of competency (Heinich et al., 1994).
3. *Simulation.* Heinich et al. (1994) defined simulation as a situation where the user confronts a scaled-down approximation of a real-life situation. The simulated environment allows realistic practice without the exposure to the risks that may otherwise be involved.
4. *Problem solving.* Reynolds and Iwinski (1996) defined problem solving as a method for a student to use a computer to solve a work-related problem.
5. *Instructional/Educational Games.* Heinich et al. (1994) delineated gaming as the provision of a "playful" environment in which learners follow prescribed rules as they strive to attain a challenging goal. Educational games let users learn while competing with one another or with their earlier efforts in solving problems. Games usually involve the simulation of a relevant, real-world problem. Users are scored on how quickly and effectively they solve the problem (Horton, 1994).
6. *Hypertext.* In order to define hypertext, Nielsen (1995) contrasted it with traditional text. Nielsen (1995) stated that traditional forms of reading materials present the topical matter in a sequential manner, while hypertext is non-sequential and presents several different reading options. Berg and Watt (1991) emphasized hypertext's design structure and defined it as a method of organizing and retrieving text that implements retrieval links between parts of a larger document or a linked set of documents. Hypertext systems can be learner-driven, where the learner selects the path (i.e., a high degree of locus of control), or driven by the program where, based on the learner's response to particular questions, the program will select an appropriate path for the learner to branch to (i.e., a low degree of locus of control) (Borsook, 1991). The significant point about hypertext is that because there are multiple paths (branches) for each question (nodes), migration through the learning material is almost always different from one learner to another. In its most general sense, hypertext allows content to appear in different contexts (Marshall & Shipman, 1995). Nielsen (1995) noted that hypertext is well suited for open-learning applications where the learner is allowed freedom of action and is encouraged to take the initiative to move forward in the presentation but is less suitable for the drill-and-practice type of learning. Yang and Moore (1996) compared the terms "hypertext" and "hypermedia," which are often confused or misused in the literature. Nielsen (1995) stated that hypermedia is a sub-classification of hypertext that specifies the use of multimedia effects in a hypertext presentation, such as graphics, animation, pictures, and movies. Nielsen (1995) felt that the term "hypermedia" only adds to the confusion of terminology in the field and, as a result, suggested using only the term "hypertext" for presentations that use text or text with embedded graphics.

A hypertext link has two ends (links). Links are almost always anchored at their departure point to provide the user with some explicit object to activate in order to follow the link. Even if a link is not bi-directional, there may still be a need to anchor it explicitly at the destination node (McAdams, 1993; Nielsen, 1995). Most frame-base hypertext systems only have links that point to an entire node, but when the destination is large, it is an advantage for the user to have the system point out the relevant information more precisely (Thuring, Hannemann, & Haake, 1995).

REFERENCES

Abramson, G. W. (1992). Helping teachers create high-order, highly-motivating, hypermedia based learning experiences. Part I: HyperCard. SIGTC Connections: *The Journal for Technology Coordinators. International Society for Technology in Education*, 9(1), 1-7.

Abramson, G. W. (1993). Digital Images in HyperMedia Productions. *Journal of Interactive Instruction Development*, 5(1), 3-8.

Air University (AU) (1996). Research and Development of Interactive Distance Learning Technology: Interactive Multimedia Distance Learning (IMDL) Project. *Air University Web Page* [On-line]. Available: http://www.brooks.af.mil/HSC/AL/HR/HRT/HRTT/imdl.htm.

Anderson, R. & Veljkov, M. (1990). *Creating interactive multimedia: A practical guide*. Glenview, IL: Scott, Foresman.

Andleigh, P. & Thakrar, K. (1996). *Multimedia Systems Design*. Upper Saddle River, NJ: Prentice Hall.

Ashley, C. (1992). University of Phoenix graduates first class of on-line MBAs. *Online Review*, 16(3), 161-163.

Berg, S., & Watt, J. (1991). Effects of educational setting on student responses to structured hypertext. *Journal of Computer-Based Instruction, 18*(4), 118.

Blum, B. (1995). *Interactive media: Essentials for success.* Emeryville, CA: Ziff-Davis.

Borsook, T. (1991). Harnessing the Power of Interactivity for Instruction. *Proceedings of Selected Research Presentations at the Annual Convention of the Association for Educational Technology,* 123-137. (ERIC Document Reproduction Service No. ED 334 976)

Butler, J. & Clouse, W. (1996). Educational Technology and the Teaching of History: Promise, Practice, and Possibilities. *Journal of Educational Technology Systems, 24* (3), 211-223.

Carlson, P., Hitzfelder, E., Hudson, T., & Redmon, D. (1996, March). Classrooms as test-beds for educational software design. *Technological Horizons in Education (T.H.E.) Journal, 23*(8), 75-78

Center for Educational Technology (1976). *Interservice Procedures for Instructional Systems Development* (Contract No: N61339-73-C-0150). Tallahassee, FL: Florida State University.

Chen, C., & Brown, S. (1994, April). *Results of the Computer Use Survey for School of Education Students.* Paper presented at the annual meeting of the American Education Association, New Orleans, LA.

Costello, J., Curtis, S., Joyce, E., & Singer, I. (1995, Fall). Interactive multimedia design: A visual approach. *Journal of Interactive Instruction Development, 8*(2), 3-7.

English, R. & Reigeluth, C. (1996). Formative research on sequencing instruction with the elaboration theory. *Educational Technology Research and Development, 44*(1), 23-41.

Falk, D. R. & Carlson, H. L. (1995). *Multimedia in Higher Education: A Practical Guide to New Tools for Interactive Teaching and Learning.* Medford, NJ: Learned Information, Inc.

Flagg, B. N. (1990). *Formative evaluation for educational technologies.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Fulton, K. (1993, Fall-Winter). Teaching matters: The role of technology in education. *Ed Tech Review,* 5-10.

Gagne, R., Briggs, L., & Wager, W. (1992). *Principles of instructional design* (3rd ed.). New York: Harcourt, Brace, and Jovanovich.

Goldstein, I. (1993). *Training in organizations.* Grove, CA: Brooks/Cole.

Garzotto, F., Mainetti, L., & Paolini, P. (1995). Hypermedia Design, Analysis, and Evaluation Issues. *Communications of the ACM, 38*(8), 74-85.

Heinich, R., Molenda, M., & Russell, J. (1994). *Instructional media and the new technologies of instruction* (4th ed.). New York: Macmillan.

Hoelscher, K. (1995). It's Too Late to Dig the Well When Your House is on Fire: Using Formative Evaluation to Increase the Educational Effectiveness of Technology Products. *The Electronic Classroom: A Handbook for education in the electronic environment.* Ed: Erwin Boschmann. Medford, NJ: Learned Information.

Hofstetter, F. (1995). *Multimedia Literacy.* New York: McGraw-Hill.

Horton, W. (1994). *Designing and Writing Online Documentation* (2nd ed.). New York: Wiley.

Howe, W. & Lisi, P. (1995, May/June). Beyond Diversity Awareness: Action Strategies for Adult Education. *Adult Learning,* 19-20, 31.

Isakowitz, T., Stohr, E., & Balasubramanian, P. (1995). RMM: A Methodology for Structured Hypermedia Design. *Communications of the ACM, 38*(8), 34-44.

Kaiser, J. (1991). *Development of CAI: An expert system in education.* East Carolina University. (ERIC Document Reproduction Service No. ED 304 483)

Kay, A. (1996). Revealing the elephant: The use and misuse of computers in education. *Educom Review, 31*(4), 22-28.

Kirkpatrick, D. (1994). *Evaluating Training Programs: The Four Levels.* New York: Berrett-Koeher.

Little, C. (1996, April). Mediating the message: Converting pre-existing materials involves more than a new coat of interactive paint. *Multimedia Producer, 2*(4), 23-24.

Mager, R. (1988). *Making Instruction Work.* Belmont, CA: Lake Publishing Co.

Marshall, C. & Shipman, F. (1995). Spatial Hypertext: Designing of Change. *Communications of the ACM, 38*(8), 88-97.

Mauldin, M. (1996). The development of computer-based multimedia: Is a rainforest the same place as a jungle? *Techtrends, 41*(3), 15-19.

McAdams, M. (1993, February). Intelligent Agent. *HotWired,* 29-33.

McKnight, C., Dillon, A., & Richardson, J. (1993). Why Psychology? In C. McKnight, A. Dillon, and J. Richardson (eds.), *Hypertext: A psychological perspective.* New York: Ellis Horwood.

Merrill, M., Schneider, E., & Fletcher, K. (1980). *TICCIT.* Englewood Cliffs, NJ: Educational Technology.

Merrill, P. (1987). Job and task analysis. In R. Gagne (Ed.), *Instructional technology: Foundations* (pp. 141-174). Hillsdale, NJ: Lawrence Erlbaum Associates.

Merrill, P. (1996, July). Illustrating the heart of interactive. *Multimedia Producer, 7*(2), 36-43, 66-67.

Milheim, W. D. (1996). Utilizing Case Studies for Teaching Effective Instructional Design Principles. *International Journal of Instructional Design Principles,* 23(1), 23.

Nielsen, J. (1995). *Multimedia and hypertext: The internet and beyond.* Boston: Academic Press Professional.

Reese, S. (1994, June/July). Music Technology: Tools for Extending and Sharing Minds. *American Music Teacher,* 12-13, 90.

Reeves, T. (1989). Research and evaluation models for the study of interactive video. *Journal of Computer-Based Instruction, 13,* 102-106.

Reushle, S. (1995). Design considerations and features in the development of hypermedia. *Distance Education, 16*(1), 141-156.

Reynolds, A. & Iwinski, T. (1996). *Multimedia Training: Developing Technology-Based Systems.* New York, NY: McGraw-Hill.

Simonson, M., & Thompson, A. (1994). *Educational computing foundations* (2nd ed.). New York: Macmillan.

Thuring, M., Hannemann, J., & Haake, J. (1995). Hypermedia and Cognition: Designing for Comprehension. *Communications of the ACM, 38*(8), 57-66.

Van Patten, J. (1996). What is instructional design? In K. Johnson and L. Foa (Eds.), *Instructional design: New alternatives for effective education and training.* Phoenix, AZ: Oryx Press.

Vaughn, M. & Thuente, K. (1995, May). Using technology in early learning classrooms. *Learning and leading with technology, 22*(8), 8.

Yang, C. & Moore, D. (1996). Designing hypermedia systems for instruction. *Journal of Educational Technology Systems, 24*(1), 3-30.

HN

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The Wonderful World of Time

BART HOFFMAN

KEYWORDS:
Student Authors, Contest Winner, Analog Clock

Dear Teachers and Students,

The following directions are for *The Wonderful World of Time*. You will need these instructions to help you and your students use this program. For the first game, "What Time Is it?", you will need to tell the user to drag the cursor to the box where the answer shall be written. Then have him or her click the mouse in the box. Next have him or her type the answer and push the "check it" button. If the answer is correct, the screen will say, "Good!" If it's incorrect, it will say, "Sorry!" Once your answer is correct, push the "next card" button, and it will take you to the next card. These are all the directions for the first game.

For the second game, "Find the Time", there are really no important directions to help. All you need to do is click on a clock and it will tell you if your answer is correct or incorrect. If you are correct, it will take you to the next card. We hope you and your students enjoy this game. Have fun!!!

Sincerely,

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Marisa Ramirez
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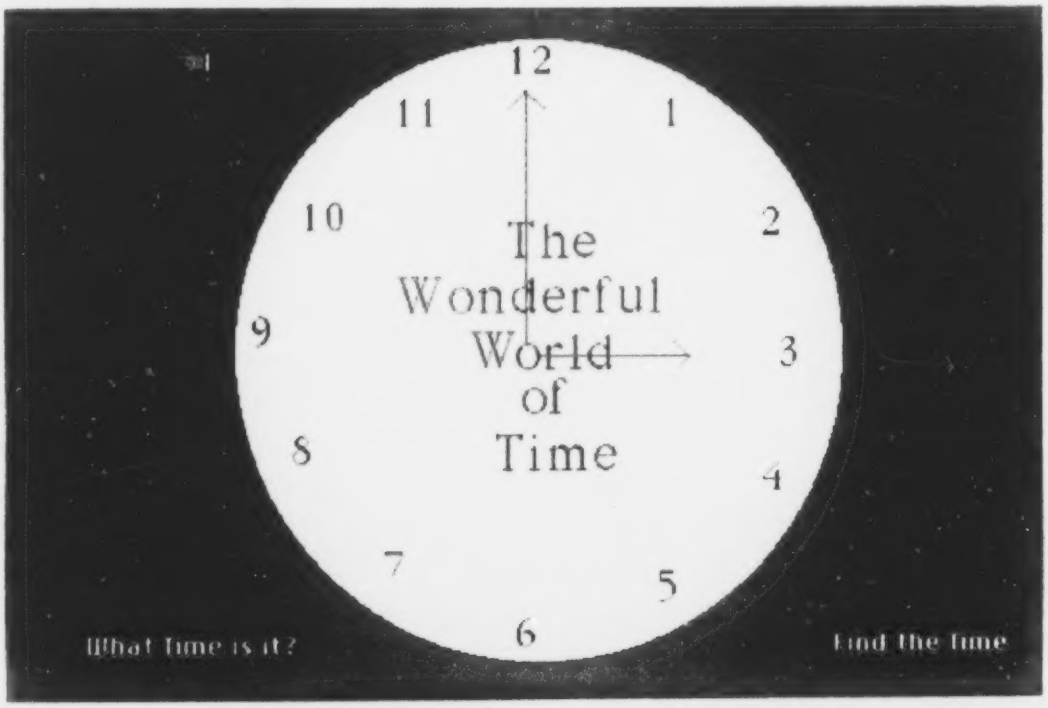
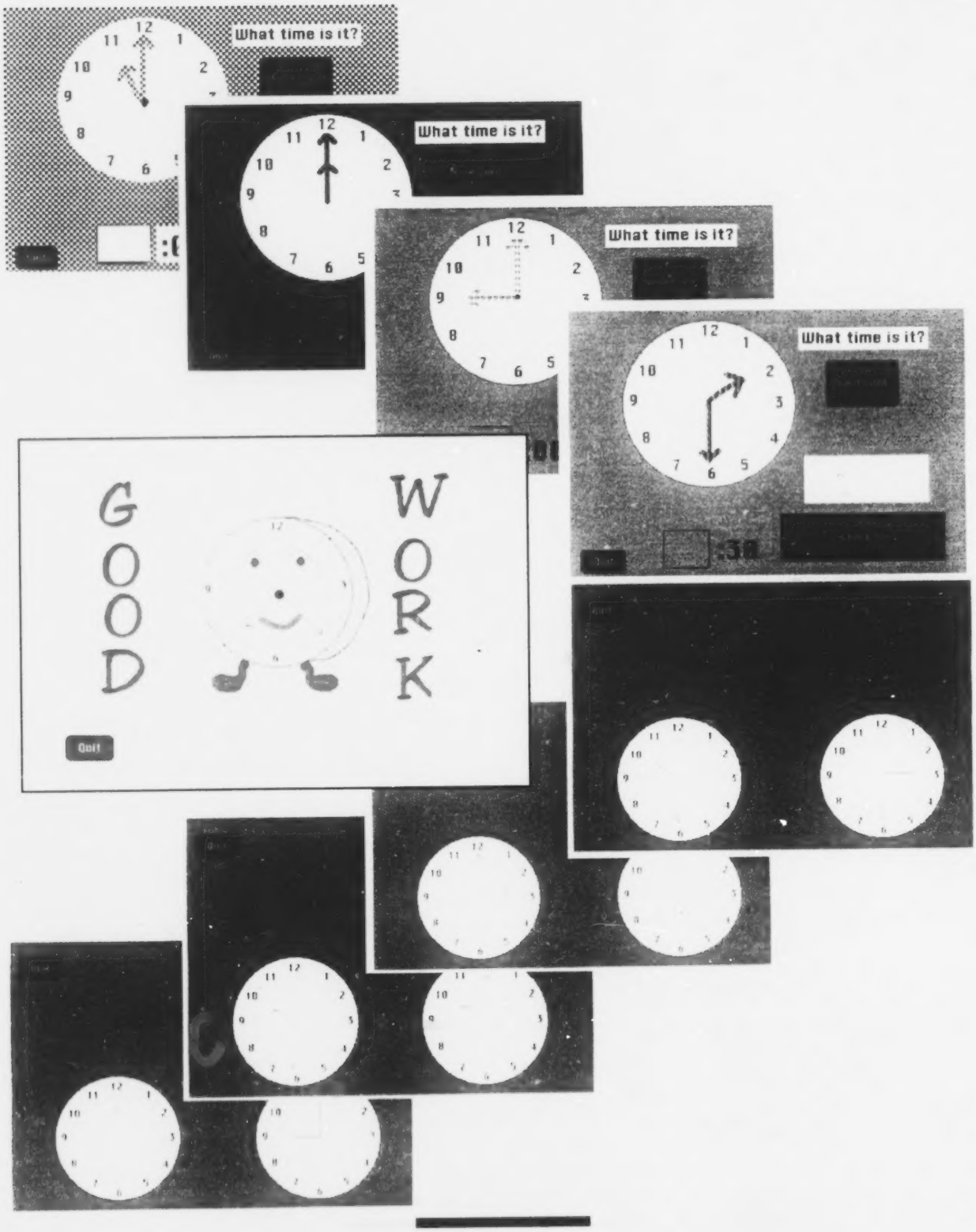


BEST COPY AVAILABLE


What time is it?
What time is it?
What time is it?
What time is it?
GOOD WORK
Quit

Security in the Telelearning Environment

Part I: Cyberinvasions and Countermeasures

MARLYN K. LITTMAN

KEYWORDS:
Responsible Telecomputing, Privacy, Security, Acceptable Use

FUELED BY THE PHENOMENAL popularity of the World Wide Web, today's Internet provides ready access to a wide range of information for curricular enhancement and enrichment in the school and university setting. The pervasive use of communications technologies, enabling virtually ubiquitous and instantaneous Internet connectivity and cost free self-publication, is accompanied by an expanding need for security in order to safeguard information confidentiality, integrity, availability, utility, and authenticity.

From the perspective of the school and university environment, these requirements lead to distinct yet related security challenges:

- How can the academic computing environment be safeguarded from cyberinvasions initiated at other points along the Internet?
- How can workable procedures and policies be established and implemented to encourage responsible computing and prevent access to information deemed inappropriate?

Part I of this article features reports of my case study research with educators throughout the country on tactics for addressing challenges associated with cyberinvasions. I examine procedures for implementing a security policy responsive to user needs and institutional requirements. I also delineate techniques for minimizing vulnerabilities and designing and deploying safeguards for network-based information access.

The Internet is an indispensable educational resource. However, it also carries potentially harmful content that can lead to electronic harassment, unauthorized distribution of copyrighted works, illegal drug production, and incitement to hatred, discrimination, and violence. Part II of this article examines strategies for creating a climate of trust that supports internetwork communications in the telelearning environment. I will describe mechanisms for evaluating information content and measures for protecting data from unauthorized disclosure.

Security Problems

Security breaches in the telelearning environment are as varied as the individuals who create them. Security incidents are initiated by disgruntled or unethical employees logging into unattended institutional terminals or PCs (personal computers). Hackers intrude with the intent of cracking any system that allows outside access. Cybervandals log into guest- or vendor-supplied default accounts or install packet sniffers on computer networks to monitor communications traffic and collect password information. Probably one of the best known hackers in the United States, Kevin Mitnick, allegedly stole passwords to break into systems at America Online (AOL), the Colorado SuperNet (CSN), and the San Diego Supercomputer Center (SDSC).

Computer networks are penetrated with lightning speed, resulting in infringements ranging from deliberate dissemination of child pornography, copyrighted material, misinformation, and interference with official transmissions to online eavesdropping, snooping, and invasion of privacy. Malicious invaders can practice electronic sabotage by masquerading as legitimate users in order to read, monitor, and overwrite network files and assume control of network functions.

Individuals determined to break into networked computers are always looking for new ways to snoop around, modify, destroy, or steal data. Hackers intent on disabling a network use PING (Packet INternet Groper), a software

utility that is configured to flood an Internet address with thousands of messages every second. Also, they may introduce a worm or automated program that through replication uses up network resources until the network eventually shuts down (Littman, 1995). Damage also is inflicted on network resources by intruders who insert Web-based malicious applets or small programs that trigger data loss upon being downloaded from a network server and used on a client computer.

At the University of Delaware, cyberinvaders penetrated the university's operating system and also stole computing resources to create their own bulletin board for exchanging commercially pirated software on the school's network (Littman, 1996a). At Nova Southeastern University, infiltrators breached network security, cracked legitimate passwords with packet sniffers, set up directories on a university network server, and then, by masquerading as authorized users, launched attacks on other networks (Littman, 1996b).

Crackers render network services unusable by exploiting the capabilities of free network management products on the Internet. For example, SATAN, the Security Administrator Tool for Analyzing Networks, is a software tool that is freely available on the Web (http://ciac.llnl.gov/ciac/). With SATAN, network administrators probe for and identify security loopholes at networked computer sites. However, this tool is also used by cybercrackers to acquire information on security flaws to divert electronic communications from intended recipients and surreptitiously disrupt network activities.

Even when countermeasures are in place, defensive plans are formulated, and staffers are alert to possible offensives, hackers still inflict damage through fraud, reckless destruction or modification of data, online rip-offs, and placement of offensive or illegal information online. Jane Anne Hannigan (personal communication, May 17, 1997), professor emeritus at Columbia University, noted that a colleague's Web site on young adult literature posted on a Rutgers University network server was pirated by a malicious invader who subsequently altered the information and inserted hotlinks to sexually explicit images and videos on the Internet. The offender was never apprehended.

Hackers still cause obvious damage through fraud, recklessly destroying or modifying data, online rip-offs, and making offensive or illegal information available online.

What lessons can be learned from these incursions? Is every network linked to the Internet vulnerable to misdeeds, harm, electronic thievery, and fraud? According to Alan Liddle (personal communication, January 20, 1995), lieutenant commander with the Royal Navy and professor of systems management at National Defense University, all networks are susceptible to intrusion, because Internet connections are never 100 percent secure. Liddle added: "Collecting the evidence on how big and frequent break-ins are is extraordinarily difficult; but even a conservative extrapolation from those reported indicates the problem is significant."

Viruses

An ongoing threat to security is the computer virus, an executable code that is buried in a file. After the file is activated, the virus code executes and replicates itself by infecting other files in a computer or throughout a network.

Viruses take many forms, ranging from logic bombs designed to go off when a specific event occurs to cruise viruses that target specific programs. Viruses require a host and originate in shareware, freeware, and new and repackaged computer programs. Additionally, viruses are introduced into network systems when public domain software is downloaded from Internet bulletin boards, and through specific acts of vandalism or the exchange of infected files on a network. For example, WinWord.Concept, a virus affecting Microsoft Word documents on Macintosh, PC, and Unix platforms, was transmitted across the Internet in data files such as e-mail attachments (http://clem.digital.net/wwmacro.html).

Symptoms of viral invasions range from changes in executable program size to erasure of program files and utilities. They can destroy entire disk surfaces and even computer hardware.

An effective virus prevention plan involves deployment of anti-virus products for scanning new software, data diskettes, and program files before they are placed into operation. However, anti-virus monitoring and control software are generally insufficient to prevent computer crime. Information users must be security conscious for automatic security provisions to be effective.

Privacy Issues

A computer network supports the exchange and delivery of personal information such as home addresses, social security numbers, and medical records. This information can be made available improperly to government agencies, employers, telemarketers, and hackers. Also, confidential documents sent by a remote user to a network server can be intercepted by unauthorized individuals (Littman, 1996a).

One approach to maintaining confidentiality is to inform authorized us-

ers of their rights of access and categories of data involved. For instance, William Piotrowski (personal interview, March 15, 1995), chief of information services with the Leon County (Florida) School Board, commented: "In Leon County, only users with a direct and legitimate interest or a need to know can access confidential information on our school network subsequent to signing a binding agreement. This access must be consistent and appropriate with job functions."

Privacy protection also involves maintaining information integrity so that cybercriminals cannot subvert personal data online. The University of Houston uses a system of internal controls to protect its information assets from both intentional and accidental disclosure (http://www.uh.edu/home-light.html). Abuses such as unauthorized modification and deletion of online data, files, and programs; document insertion; and password disclosure constitute a violation of procedures, standards, and guidelines, which can result in disciplinary action including dismissal, expulsion, and legal prosecution.

Acceptable Use

Recent publicity about Internet use as a conduit for pornography, cybergambling, and assorted criminal activities led to the development and implementation of acceptable-use agreements and contracts in the school and university environment. For instance, Internet users on California's Modesto City Schools Network are required to sign an agreement stipulating they will follow guidelines established in the Electronic Communications Privacy Act to prevent pornographic material, copyrighted software, and files dangerous to network integrity from entering the school network. They also agree not to change passwords or alter user account information, and to report all violations to school administrators. Sanctions for violations can include suspension and revocation of Internet access and network privileges, school suspension, legal action and prosecution, and financial liability for loss of network resources (http://www.monet.stanco.k12.ca.us/)

User agreements and contracts promoting acceptable use of electronic information are designed to reduce computer crimes. Commercial products and tools supporting data integrity and authentication can enhance network security, yet these mechanisms are circumvented by individuals intent on discovering points of entry and system flaws. According to Liddle, an infocriminal determined to damage your reputation one morning could place a DUI (Driving Under the Influence) charge on your driver's license record by the afternoon (Littman, 1995).

Security Policies

The widespread use of information technology in the school and university setting brings with it the corresponding need for security to maintain data integrity and confidentiality while reducing exposure of network resources to accidental or unauthorized modification, corruption, and disclosure. In the telelearning environment, security also ensures that computing resources are used to accommodate educational, research, community service, and administrative objectives. Designing a security policy that safeguards the integrity of institutional electronic resources and computer networks, and clarifies guidelines for their appropriate and responsible use, requires careful analysis and assessment.

A security policy defines access rights for authorized users depending upon their role and responsibilities in the school and university environment, and whether their access to specific network sites should be blocked or disabled, because the wealth of information on the Internet can be a distraction to users or even a possible legal liability. A security policy includes:

- Procedures for supporting information confidentiality, privacy, and reliable message delivery; reporting security breaches; and reacting quickly when under attack.
- Strategies for back-up and disaster recovery from fire, floods, earthquakes, and hurricanes.
- Safeguards for protecting on-site computing equipment from sabotage, vandalism, and theft are delineated.
- Names of personnel responsible for handling security breaches.
- Contacts in case of emergency.
- Sanctions for violations.
- Budget allocations for implementation and maintenance to ensure the acquisition and use of resources and mechanisms needed for effective functioning on a daily basis.

The security policy must be reviewed and updated periodically to reflect network changes that prohibit information tampering. The review promotes security awareness and exposes neglected or overlooked hazards and threats.

Generally, security in the telelearning environment is a trade off with expedience. Most users seem willing to accept a higher level of risk rather than forgo use of networking services. Performing a risk assessment aids in identifying critical resources to be protected and determining minimum security requirements. What are the consequences, for instance, if students gain unauthorized access to their grade reports and transcripts? What are the repercussions if outsiders delete faculty research data? What procedures should be put in place to deal with mail bombs that clog accounts with unwanted messages or rogue programs that interfere with online registration and enrollment procedures? The extent of protection needed is based on the perceived risk.

No amount of planning for security concerns, however, will be effective if individuals are careless in taking the necessary precautions to use the technology properly.

There is no single solution for countering intrusions. A security policy reflects multiple approaches for safeguarding computer software, hardware, and electronic information, and requires an understanding of the fundamentals of security technology. Protecting network access points from subversion, particularly in a distributed computing environment, is difficult. Because any security plan can be broken, the notion of safeguarding all nodes on a computer network from unauthorized access is illusory. As Piotrowski (personal communication, March 15, 1995) points out: "The prudent thing to do is try to be proactive."

Identification and Authentication Mechanisms

User identification, authentication, and authorization are keys to building a safe computing environment. Security policy creation involves determining who is allowed to use network resources, the extent of their privileges on the system, and their rights and responsibilities.

The University of Calgary, Memorial University in Newfoundland, Humber College, Villanova University, and Xavier University issue universal identification cards to ensure that only verified members of the learning community use campus computing resources and facilities, check-out library books, enter campus residences, and participate in campus activities. These cards feature magnetic strips or holograms on the back, a color photograph of the cardholder on the front, and the institution's logo (http://www.hasp.com/ase/ase.htm).

Smart cards are distinguished by their support of multiple applications and advanced security functions, such as public key cryptography and authentication. These hand-held portable devices provide access control for logging on to a computer network and using electronic resources.

Biometric identifiers such as voice printing, retinal scans, photo-imaging, digital signatures, hand geometry, and finger imaging are also emerging as important authentication techniques for verifying the identity of users accessing institutional computer networks and extranets. According to Steven Huber (personal communication, March 3, 1995), manager of advanced technologies for Martin Marietta Information Systems, in an era where user authentication is critical to safeguarding transactions, maintaining institutional information, and preventing computer crime, universal identification cards, smart cards, and biometric identifiers are becoming more commonplace, particularly in the business and health care communities. Although use of these devices raises genuine concerns about due process, individual liberty, and privacy, their presence should expand significantly in the school and university environment.

A security policy reflects multiple approaches for safeguarding computer software, hardware, and electronic information, and requires an understanding of the fundamentals of security technology.

Password Security

Passwords provide access to a wide range of computing services, and almost all systems require them, yet many individuals show a remarkable lack of imagination when selecting passwords. They often base their passwords on a variation of their user names, which are publicly known, or select common names, common words, and acronyms.

Careless password selection and use are leading causes of network incursions. To identify passwords, crackers run commercially available password-cracking programs or try every entry in a dictionary (Littman, 1995). Stolen passwords empower cybervandals to access, modify, and destroy files; send e-mail; subscribe to unwanted services; capture personal data about other users logging on to the system; and infiltrate distant systems to which local users connect.

Tactics for ensuring network integrity against password attacks in an Internet environment include deactivating old accounts, encrypting passwords, restricting users to one log on at a time, and prohibiting the reuse of previously selected passwords. Ideally, a password should be easy to remember but hard for someone else to guess. It should not be placed in an online file, written down and hidden in a top desk drawer, or pasted on a computer monitor.

Encryption and Digital Signatures

Beyond universal identification cards, smart cards, biometric identifiers, and passwords, there is a growing security technology that uses encryption and digital signatures for preventing propagation of misinformation. Encryption involves scrambling information into a meaningless form before transmission to keep it safe from unauthorized tampering. Like encryption, digital signatures support data origin, authentication, and integrity.

Encryption uses an algorithm and a key. The algorithm transforms plaintext into ciphertext and then converts the ciphertext back into plaintext. Popular encryption algorithms include DES (Data Encryption Standard) and RSA (Rivest, Shamir, Addleman). Theoretically, DES is controlled by the United States government, which limits exports of encryption software and hardware. However, as Hendry (1995) notes, DES is widely used and distributed with versions reportedly available as shareware.

Developed by a consortium that includes MIT (Massachusetts Institute of Technology), Apple, and Microsoft Corporation, the Public Key Cryptography Standard (PKCS) defines mechanisms for encrypting and signing data using RSA encryption. RSA Secure is a commercially available software package that supports file encryption on a PC or on a network (http://www.rsa.com/PUBS/).

A key is a random bit string or block of data used in conjunction with the algorithm at the sending and receiving sites to facilitate the encryption and decryption process, with the same key generally used by the sender and receiver.

The key has a limited lifetime, and with each use it generates ciphertexts that may be identified through cryptoanalysis. If a key is compromised, damaged, forgotten, or lost, an assumption must be made that a cyberinvader can read encrypted information and forge a signature on a document. Strategies for key management and control must be clearly delineated to prevent unauthorized information disclosure and malicious network attacks.

Developed at MIT, Kerberos is an authentication system based on DES that safeguards the transmission of passwords and other sensitive information in network traffic to prevent crackers from falsely claiming another individual's identity. Kerberos is available in commercially supported versions and in the public domain.

Compatible with a wide range of protocols, user interfaces, and e-mail systems, Privacy Enhanced Mail (PEM) uses encryption and digital signatures to ensure transmission integrity of sensitive information and protect the contents of e-mail messages from unauthorized disclosure. With PEM, users cannot hide behind anonymous remailers. Like PEM, the PGP (Pretty Good Privacy) standard supports encryption of messages to be transmitted or stored locally as files, enabling individuals to communicate securely over the Internet.

Promoted by the United States government, the Clipper Chip is a hardware solution designed to support secure internetwork communications for the public in general while allowing law enforcement agencies to monitor the communications of suspected criminals (http://www.rsa.com/) Those opposed to the Clipper Chip view its use as an invasion of privacy.

Emerging Standards and Initiatives

Emerging standards supporting safe network transactions include S-HTTP (Secure HyperText Transfer Protocol), SLL (Secure Socket Layer) Handshake Protocol, and S/MIME (Secure/Multi-purpose Internet Mail Extension). S-HTTP is an extension to HTTP (HypterText Transfer Protocol) that supports confidentiality, integrity, authenticity and a variety of cryptographic algorithms. Like S-HTTP, SSL also enables reliable network transmission and reception.

MIME is a standard format for sending e-mail messages that include audio, video, images, and graphics in addition to text. Endorsed by Microsoft Corporation, S/MIME is a protocol that adds encryption and digital signatures to Internet MIME transmissions.

The Internet Privacy Coalition (IPC) advocates the preservation of an individual's right to privately and securely communicate in the online world without government restraints, interference, and restrictions (http://www.-privacy.org/ipc/). The IPC promotes the public availability of encryption tools and legislative initiatives such as the SAFE (Security and Freedom through Encryption) Act for making encryption tools available worldwide.

The National Institute of Standards and Technology (NIST) promotes the design of interoperable and reliable authentication systems and technologies. The National Computer Security Association (NCSA) is establishing an Internet Service Providers Security Consortium (ISPSeC) and an industry standard of due diligence against claims of negligence by certifying commercial Web site security. The American Insurance Group is formulating a Web site insurance policy for protection against financial loss and liability arising from Web use.

Firewalls

A firewall is designed to isolate and protect an internal network, such as an intranet, from an extranet like the Internet where invasions can originate. In many instances, the firewall is the major tool used for institutional security.

For example, the Gauntlet Firewall, developed by Trusted Information System, employs strong user-authentication mechanisms and specific software-application gateways to block attacks and control network access for strict security enforcement. Gauntlet Firewalls allow multi-national educational institutions to create global virtual private networks over low-cost Internet communications links to optimize information access and user productivity (http://www.tis.com/).

Monitoring Access

Intrusion detection systems, such as Internet Security Systems' RealSecure, AT&T's Computer Watch, TRW's Dis-

covery, and SRI International's Intrusion Detection Expert System, automatically and transparently monitor network traffic in realtime to guard against network break-ins (http://www.breakwater.net/). These network security-assessment tools enable institutions to identify and eliminate security holes and vulnerabilities that could allow unauthorized use of computer resources, modification of system files, and access to user information. Log-file analysis tools, such as Software's WebTrends, Microsoft Corporation's Market Focus, Aquas Inc.'s Bazaar Analyser Pro, and Sane Solutions' NetTracker, allow network analysts to monitor visitors and their actions at Web sites and prevent illegal entry and activities as well.

Cookies

Cookies are unique identifiers or small bits of information that a Web site asks a browser to store on the user's PC. Cookies are regarded as valuable mechanisms for tracking a visitor's movements at a Web site, simplifying log-on procedures, and customizing content based on a visitor's past preferences.

Because cookies are also used to monitor surfing behavior, keep records of graphics downloaded and newsgroups accessed, and extract e-mail addresses and user IDs, they are considered an infringement on the freedom to explore cyberspace. Rumors of Web sites sharing information collected by cookies contributed to the creation of a recent proposal by the IETF (Internet Engineering Task Force) that would allow users to exercise greater control over the creation and collection of personal information between Web clients and servers while preventing outsiders from matching their virtual identity with their actual identity.

Packages such as NSClean for Netscape and IEClean for Microsoft Internet Explorer from Altus Software enable users to see, clear, and change information recorded by cookies on their machines (http://www.altus-software.com/). These software products also allow individuals to hide their true identities through the use of aliases.

Research Initiatives

The Security Lab at the University of California at Davis is developing intrusion detection technology for safeguarding wide area networks (WANs). Additional research initiatives include the GrIDS project in which graph representations of network activities are used to detect abuse and thumbprinting, a technique for tracing intruders over the network (http://olympus.cs.ucdavis.edu/arpa/arpa.html). The Visual Audit Browser Toolkit, also in development, is a set of tools designed for inspection and analysis of audit log data.

Sponsored by Purdue University, COAST (Computer Operations, Audit, and Security Technology) initiatives include development of methods for distributing security relevant patches to critical systems, tools for intrusion detection, and techniques for network protection (http://www.cs.purdue.edu/coast/). The COAST Firewall Group is assessing the viability of system monitoring tools such as COPS (Computer Oracle and Password System), a security program that attempts to identify security risks on Unix systems. Available on the Internet, the COAST Archive features a comprehensive collection of documents, reports, and tools on computer security and information protection.

Security Warnings and Advisories

The IETF works with network and system administrators in developing site-specific policies and procedures for dealing with security breaches and their prevention (http://rs.internic.net/usv/usv-index.html). Organizations such as the Computer Security Institute and the Information System Security Association provide material on computer security issues and Internet perils to information security professionals and practitioners. CIAC (Computer Incident Advisory Capability) distributes bulletins providing information on security vulnerabilities and recommended actions to employees and contractors of the United States Department of Energy (http://ciac.llnl.gov/). Bulletins from CIAC are signed with a PGP encryption key.

FIRST (Forum of Incident Response and Security Teams) is an international consortium of government, academic, and private-sector agencies that handles computer security incidents and promotes cybersecurity solutions (http://www.first.org/). A member of FIRST, AUSCERT (Australian Computer Emergency Response Team) provides material on computer crime and its prevention to Internet users in Australia (http://www.auscert.org.au/).

The CERT (Computer Emergency Response Team) Coordination Center at Carnegie Mellon University distributes security advisories, vendor-initiated bulletins, warnings about security problems and attacks, and recommendations for obtaining patches or working around known computer security problems (http://www.cert.org/). The CERT Web site features a comprehensive collection of security documents.

Cyberguidelines and Cybercommerce

The explosive growth of the Internet and online communications has triggered the development of cyberspace policies and regulations. These activities relate to fair use and copyright infringement, freedom of expression, First Amendment rights, cryptography, intellectual property protection, privacy, safety, and cybercommerce. The UCLA Online Institute for Cyberspace Law and Policy focuses on new directions in cyberspace litigation and major cases and key statues affect-

ing activities in the online universe (http://www.gse.ucla.edu/iclp/hp.html).

Security and confidentiality come into question in selecting information to be placed on school and university computer networks. These concerns also affect techniques supporting electronic commerce over the Internet. Fraudsters eavesdropping on network traffic may intercept messages and capture credit card details and verification information, such as names and addresses to purchase books from the campus bookstore. The campus billing office may in fact be a fake store front created to collect credit card numbers.

Despite the increased risk of using credit cards to make payments across computer networks, credit card-based payment systems are in development (http://www.cybercash.com/). Jointly designed by MasterCard International and Visa International, the Secure Electronic Transaction (SET) specification uses a blend of private and public key encryption for safeguarding online credit card transactions.

NetCheque is an electronic payment system created by the Information Sciences Institute of the University of Southern California. Authenticated users can pay for services with electronic checks sent via e-mail (http://nii.isi.edu/info/netcheque/). Signatures are verified via Kerberos. A prototype for an electronic currency system called NetCash is also in development.

Cybercommerce enables a wide array of activities in the campus environment in addition to online shopping. For instance, a European initiative called CAFE (Conditional Access For Europe) focuses on the design of an electronic wallet that enables access to restricted data and information, banking, and health care services (http://www.digicash.com/products/projects/cafe.html). Academic participants in this initiative include Aarhus University in Denmark, Catholic University of Leuven in Belgium, and the University of Hildesheim in Germany.

The use of the Internet as an electronic marketplace for commercial transactions also has implications for intellectual property. Without enforceable legislation, a copyright owner's right to benefit financially from intellectual property available in a digital format on the Internet is at risk. The same legal protection that applies to educational and information products and their use in the physical environment also must be extended to those works disseminated via the Web. Organizations active in this arena include the World Intellectual Property Organization, which works in cooperation with developing countries in furnishing model laws, courses, seminars, and workshops (http://www.wipo.int/).

Monitoring the Internet

The Internet features a wide range of information that contributes to instructional enhancement and curricular enrichment. Yet, the Internet also carries information that is potentially harmful or illegal. Is an Internet filter an acceptable software solution for addressing widespread concerns about the effects of material deemed undesirable on youngsters in our communities? Are Internet blocking products a form of censorware? Can we strike the right balance between ensuring the free flow of information and guaranteeing protection of the public interest? Part II of this article examines recent trends and developments in Internet privacy, censorship, Acceptable Use Policies (AUPs), and access controls.

CONCLUSION

Safeguarding computer resources from attack involves constant vigilance. Alerting individuals to responsibilities in the online world requires multiple approaches. The decision to use such security mechanisms as passwords, encryption, biometric identifiers, and firewalls depends upon information sensitivity, mission critical applications supported by the network infrastructure, the available budget, and the mission, goals, and objectives endorsed by the educational institution.

Although URLs (Uniform Resource Locators) are dynamic and change frequently, the Web remains a valuable resource for tracking recent developments in the security domain. My research to date indicates that paradigms for effectively promoting responsible access to information in the telelearning environment can be developed by carefully focusing on security technical fundamentals and successfully implemented by addressing the need for ongoing faculty, student, administrative, and staff education.

References

Hendry, M. (1995). *Practical computer network security*. Boston and London: Artech House.

Littman, M. K. (1996a). Guidelines for network security in the learning environment. *Journal of Instruction Delivery Systems, 10* (1), 35-40.

Littman, M. K. (1996b). Protecting electronic data: A losing battle? In J. Varlejs (Ed.), *Safeguarding Electronic Information* (pp. 20-33). Jefferson, NC and London: McFarland & Co., Inc.

Littman, M. K. (1995). The perils of network security. In M. E. Williams (Ed.), *Proceedings of the Sixteenth National Online Meeting* (pp. 275-284). Medford, NJ: Learned Information.

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A Study for Integrating Technology with Social Studies and Language Arts

Grade 5

LINDA AUBRY

KEYWORDS:
Geography,
Language Arts,
Student-Developed Products

GOALS

- To teach use of three new software programs
- Problem-solving and cooperative-learning software
- Drawing and painting software
- Word processing software
- To review and to introduce new map reading skills
- To review and to enrich use of geographic landform terms
- To continue to work on creative writing skills, including peer editing skills
- To form an appreciation for the creativity of fellow students

Step 1

Classroom teacher prepares students and teaches the concepts of latitude, longitude, compass reading, and use of charts to record information. Discussion of cooperative learning skills and rules of group work are reviewed. Explorers and the reasons for their journeys and explorations (desire for gold) were also discussed/researched in preparation for *Geography Search*.

Step 2

Technology coordinator/teacher introduces software *Geography Search* (Tom Snyder), which students will use to plot a course for a ship to reach a yet-unknown destination. As students become familiar with the software, they are divided into teams responsible for reading and locating points using latitude and longitude, compass reading, and setting of the compass to achieve desired direction, chart reading and record of information. Students must use cooperative learning skills to achieve desired results.

Step 3

After completion of several sessions with the software, students are ready to create their own continents and "new worlds" using drawing software (*Kid Pix*). The classroom teacher previously has discussed a variety of landforms with students and has set parameters regarding number and type of landforms to be included in the project. Students work in pairs over a course of five days to create their continent, label it, and create a separate map key. Finished maps are printed.

Step 4

Student pairs use a word processing program (*The Writing Center*) to write a five-day journal of exploration of their created continent. In their journal entries, they must discuss weather conditions, climate, landforms crossed, plants and wildlife encountered, and their emotions as they explore. Journal entries are spellchecked, graphics are added and they are printed.

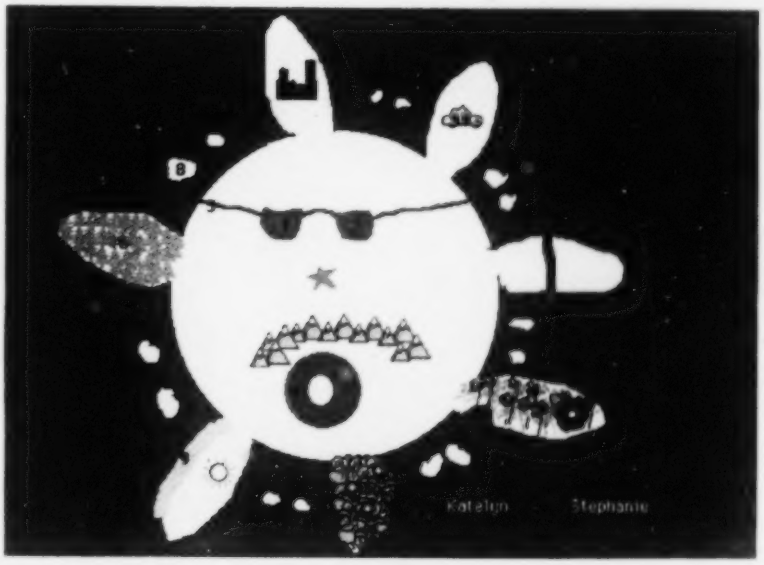
Step 5

Maps and journals are bound together to be displayed.

Step 6

Evaluation of project by students and teachers involved and sharing of work follows.

Linda Aubry, St. Rose School, 217 East Front Street, Perrysburg, OH 43551; laubry@uoft02.utoledo.edu



MAP KEY

1. Sun Lake
2. Glass Lake
3. Sun Stream
4. Lake Donut
5. "STAR CITY"(capital)
6. Sun Ray Canal
7. Mustache Range
8. Sun Kist Islands
9. Sunshine Beach
10. Sun Tan City
11. Rain Forest Pennisula
12. Katelyn's City
13. Stephanie's City
14. Flower Pach Pennisula
15. Carvin Bay
16. Forbidden Forest
17. Ray Down
18. Forget-Me-Not Ocean
19. Petal City

Katelyn
Stephanie
5A

The Journal of Katelyn & Stephanie

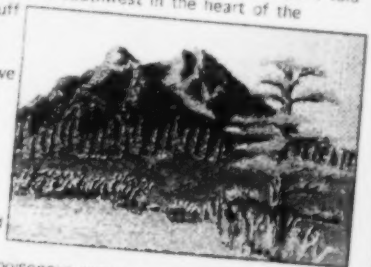
August 3, 1970

Today we arrived in a bay. We named it "Carvin Bay" because it carved in really deep. We anchored our boats and headed northeast in hope of reaching a city. When we got to the city we found out from the natives that it was called Petal City because it is on Flower Patch Peninsula. We ate a delicious dinner and went to bed with plans of exploring the next day.

August 4,1970

When we woke up the natives (who were called "Sun People") told us that there was a big city to the southwest in the heart of the continent. We packed our stuff and headed southwest.

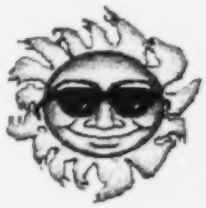
We ran into a mountain range. Later we figured out we were to far south. So we set up camp and spent the night.



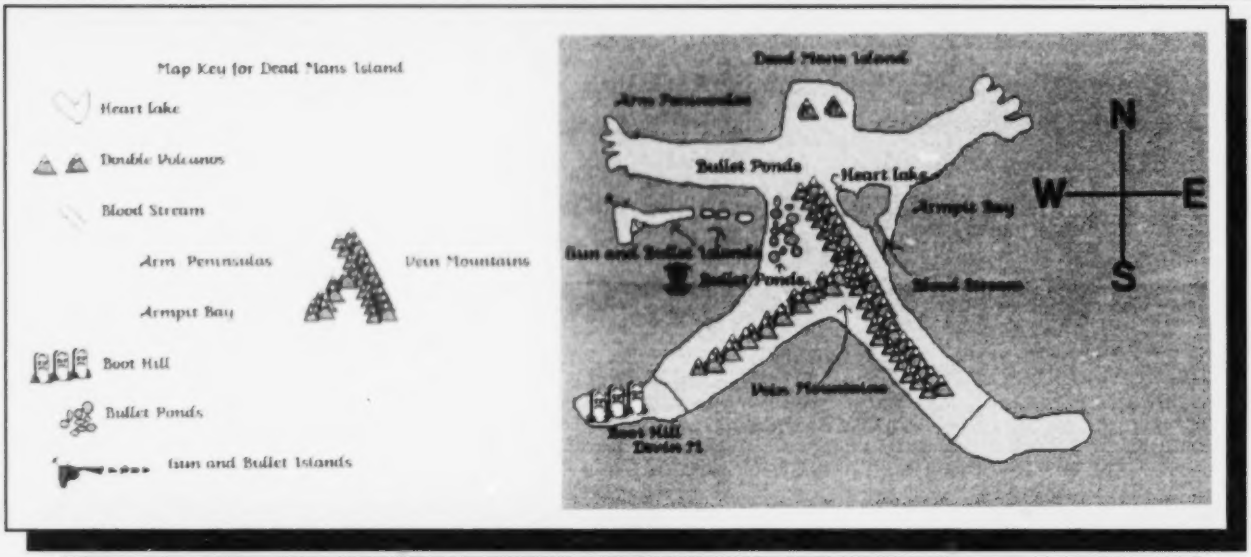
August 5, 1970

We traveled north and found the city. The natives had named it "Star City". When we got there Katelyn got bit by a poisonous snake, on the arm. Stephanie and a native by the name of Chief Iris went southwest to the Rain Forest Peninsula. There was a plant that could save her life. It worked but it had awful side effects on her.

g we decided to go to the Northwest to explore. We
with a river running through
d like a pair of sunglasses
th like glasses. So we named
and "Glass Lake". Also the river
we named "Sun Stream". We set
ent the night.



ning we headed north. We reached
t peninsula and saw little islands in between Flower Patch
named the city on the peninsula Katelyn's City. After we
we headed back to Flower Patch Peninsula. The Sun People
slands were called the Sun Kist Islands. Then we thanked
e and got in our boat which was still anchored in Carvin
with news of a new continent.


Map Key for Dead Mans Island
Heart Lake
Double Volcanos
Blood Stream
Arm Peninsulas
Vein Mountains
Armpit Bay
Boot Hill
Bullet Ponds
Gun and Bullet Islands
Dead Mans Island
Arm Peninsulas
Bullet Ponds
Heart Lake
Armpit Bay
Gun and Bullet Islands
Blood Stream
Vein Mountains
Boot Hill
Devon Pt
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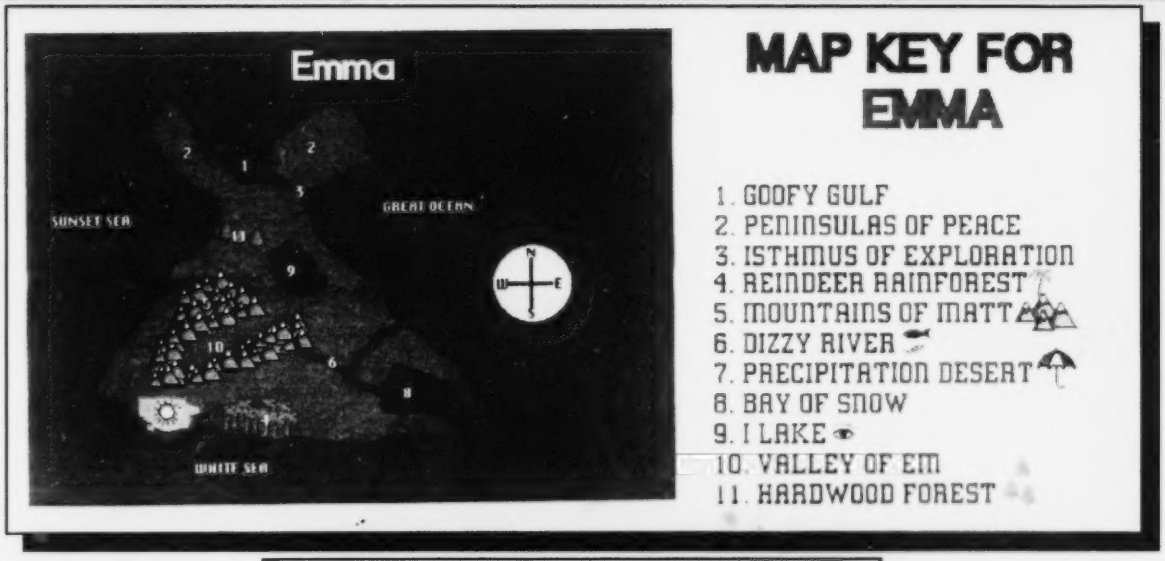
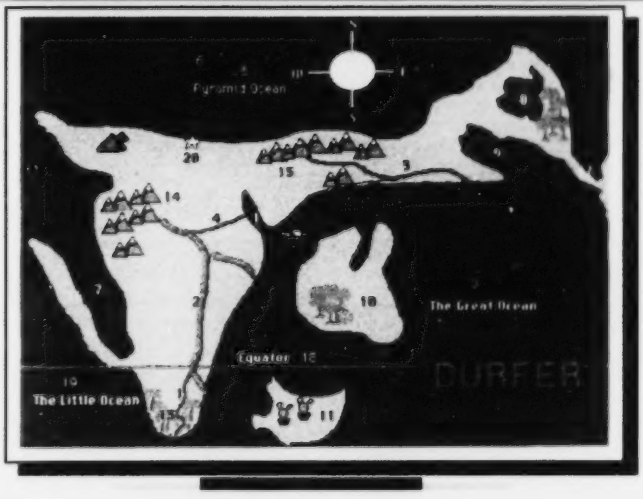

Emma
SUNSET SEA
GREAT OCEAN
WHITE SEA
MAP KEY FOR EMMA
1. GOOFY GULF
2. PENINSULAS OF PEACE
3. ISTHMUS OF EXPLORATION
4. REINDEER RAINFOREST
5. MOUNTAINS OF MATT
6. DIZZY RIVER
7. PRECIPITATION DESERT
8. BAY OF SNOW
9. I LAKE
10. VALLEY OF EM
11. HARDWOOD FOREST


The Great Ocean
Equator
The Little Ocean
DURFER

Report to the President on the Use of Technology to Strengthen K–12 Education in the United States

TRUDY ABRAMSON

Report to the President on the Use of Technology to Strengthen K-12 Education in the United States. (1997, March). President's Committee of Advisors on Science and Technology (PCAST): Panel on Educational Technology

BACKGROUND

This report was sent to me as Editor-in-Chief of *HyperNexus* with the hope that I would disseminate its findings to our readers. The work is thoughtfully prepared, contains testimony from many recognized experts in educational technology, and recommends actions we would all like to see put into place. What is most significant is that our banner now has the imprimatur of the Office of the President.

CHAPTER OVERVIEW

The Introduction provides a little background information about the members of PCAST, the panel, and its mission. Potential Significance looks toward educational technology to solve critical economic and social problems. Hardware and Infrastructure addresses current conditions in schools across the country. Software, Content, and Pedagogy discusses the essence of the educational process. Teachers and Technology talks about support, training and development time. Economic Considerations explores the costs of technology implementation. Equitable Access highlights differences in socio-economic status, gender, and race as well as physical and mental impairments. Research and Evaluation offers an historic overview followed by a case for federally sponsored research. Program and Policy attends to the directions in which federal programs might be extended and expanded.

RECOMMENDATIONS

The Executive Summary at the beginning of the report echoes the Findings and Recommendations at the end:

- Focus on learning with technology, not about technology.
- Emphasize content and pedagogy, and not just hardware.
- Give special attention to professional development.
- Engage in realistic budgeting.
- Ensure equitable, universal access.
- Initiate a major program of experimental research.

The first five recommendations resemble the messages that have reverberated through educational technology conferences and pre-service and in-service technology education classes for two decades. The sixth is a welcome

See REPORT REVIEW (page 24)

Multimedia Activities in the Classroom:

Multimedia Projects

MULTIMEDIA PROJECTS

A Book Review
Kevin Andreyo

Authors: Donna Axelson and Cynthia Nichols

Copyright: 1996

Publisher and Address: Teacher Created Materials, Inc., P.O. Box 1040, Huntington Beach, CA 92647

Price: $9.00

ISBN: 1-55734-513-9

Target audience: K-12 Teachers

Subjects: Curriculum-driven activities which allow students to practice using specific technology tools as they complete exciting projects.

MULTIMEDIA PROJECTS IS AN eclectic collection of multimedia activities for different curriculum areas including language arts, math, social studies, and science. The short book (80 pages) provides an overview of multimedia, multimedia-authoring projects for children, and projects for student presentations using videodiscs. The book also has teacher resources such as rubrics for evaluation and storyboard planning sheets for design of student multimedia projects.

Many of the projects include step-by-step directions for using *HyperStudio*, providing tips, hints, and tricks. However, the authors note that the projects can be done with other multimedia authoring tools such as *Link Way, Digital Chisel, HyperCard,* and *Multimedia Workshop*. Although *HyperStudio* doesn't have to be used to take advantage of this book, users will have to modify projects to meet the capabilities of any of the other authoring tools.

Furthermore, the authors do an adequate job of describing the differences between non-linear multimedia tools such as *HyperStudio* and *Digital Chisel*, and linear slide show or presentation programs such as *Persuasion*, *Power Point* and *Kid Pix 2*.

In a section called "Student Projects," simple multimedia ideas using videodiscs are detailed. For instance, the authors describe how to use a simple bar code program (i.e. *Bar 'n' Coder* by Pioneer) to create bar codes that add video and audio dimensions to student multimedia reports. One such method offered is the low-tech procedure of simply copying and pasting the bar codes that come with the videodisc to the reports.

For the teacher contemplating the value of multimedia, the authors provide a section identifying those benefits, including the appeal to different learning styles, the variety of means of ex-

pression for students, the experience of more real-world presentation, and the exploration into students' creativity.

The authors describe 10 daily lessons of one hour each that introduce students to multimedia authoring. Each lesson contains the appropriate amount of information that can be easily covered in an hour's time. If an instructor's class periods are shorter, the lessons—which include a brief, introductory lesson in multimedia authoring with appropriate student activities for practice and reinforcement—can be modified to meet time constraints. Another project features a research report also designed to be delivered in 10 short lessons.

The authors provide a student tutorial that outlines step-by-step procedures for using *HyperStudio* to create a simple three-card stack. If you are using another authoring program, the tutorial can be adapted to model your student handouts. The teacher may reproduce copies of materials in this book for classroom use.

RECOMMENDATION

The projects described in this book are meant to encourage the active involvement of students to become productive in this wonderful medium. These projects provide a catalyst for getting teachers excited about using multimedia. Although some schools may not have the same resources described in this book, teachers can easily modify these projects to meet their curricular objectives by using the software and hardware they have available.

Kevin Andreyo, Educational Technology Services, Project Manager, Berks County Intermediate Unit, Reading, PA 19612; kevand@berksiv.k12.pa.us

REPORT REVIEW (CONTINUED FROM PAGE 22)

turn-about for our government whose support for experimentation and evaluation of experimentation has systematically diminished during the past 25 years. There are several troublesome components to the report. To initiate a discussion among our membership, a few of these ideas are discussed below.

WHO SPEAKS FOR EDUCATION?

There is a continued reliance on business and industry to determine how schooling should be conducted. According to David E. Shaw, Ph.D., who chaired the Panel, there were "oral briefings from a number of academic and industrial researchers, practicing educators, software developers, governmental agencies, and professional and industry organizations involved in various ways with the application of technology to education." Maybe some of these "involved" groups are at least partially responsible for the limited success seen thus far in technology-supported learning. If the subjects under investigation were medical education or legal education, would similar groups be represented? Recommendation: Convene another panel and limit participation to people with education, experience, and expertise in technology-supported learning in schools and in universities. Exclude any organization with economic interests that might color judgment.

UPGRADE THE TEACHING PROFESSION

The Panel skims over the role of classroom teacher in the effectiveness of any learning endeavor. It is wrong to pour professional development money into schools whose teachers are not licensed or are teaching out of license. Within our readership are many teacher educators who have tried to help classroom teachers integrate technology into the curriculum only to discover that the teachers cannot develop lessons let alone use technology resources in the learning process. Recommendation: Recognize the significance to society of educating our youth by paying teachers as if their roles were significant. Maybe then, our best and brightest young people will choose teaching as a career.

OLD TECHNOLOGY IS NOT RELEVANT

The Report presents four meta-analyses of the effectiveness of traditional computer-based instruction dated 1978, 1981, 1985, and 1990. Why was this done? Was there no one to say that "such systems" bare little resemblance to today's computers? Recommendation: If the computing technology that is envisioned for learning includes Internet use, let January 1995 be the begin-date for examining effectiveness of technology in the schools.

FULL-TEXT ACCESS

Read the report. Discuss it at seminars, conferences, and faculty meetings. Try to obtain some of the funding that will be available for experimentation. Do good things with technology and document them for *HyperNexus*. The URL for full text is *http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/PCAST/k-12ed.html*.

Dr. Trudy Abramson, Editor-in-Chief, is Professor, Computing Technology in Education, School of Computer and Information Sciences, Nova Southeastern University.

HyperNexus

Volume 8 Number 1

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Two double-spaced hard copies of manuscripts with screen dumps and an ascii file (noting platform and wordprocessor used) should be sent by land mail. Include your name, address, phone, and e-mail address. Receipt of manuscripts will be acknowledged electronically.

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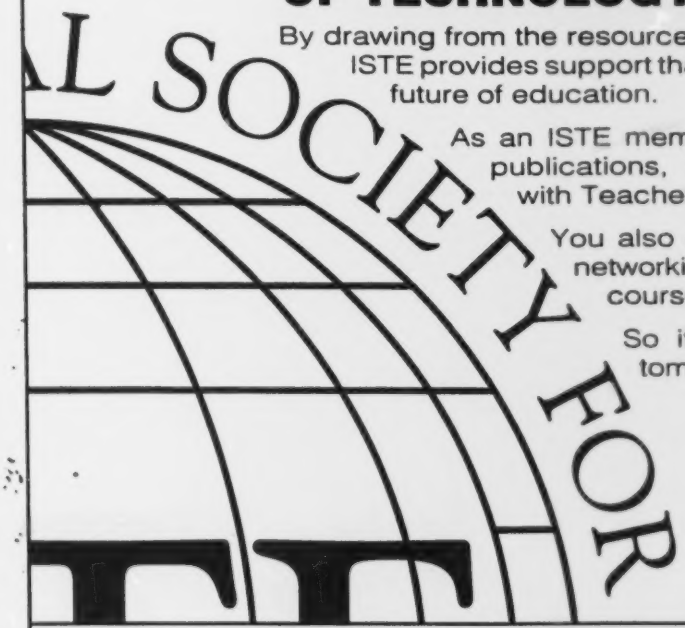

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MARCH 1998 VOLUME 8 NUMBER 2

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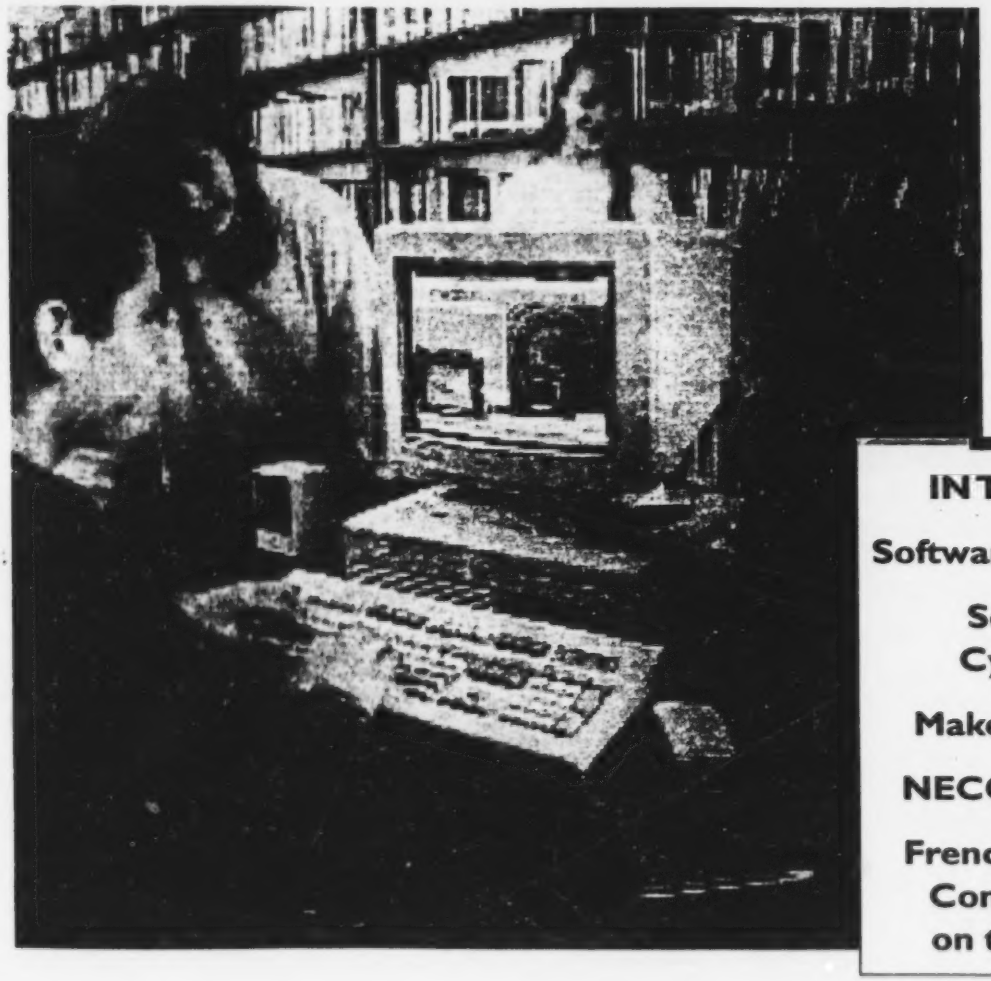

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Software that Teaches

Security in Cyberspace

Make It! America

NECC '98 Contest

French Immersion Content Taught on the Internet

A SPECIAL INTEREST GROUP PUBLICATION OF THE INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION

HyperNexus

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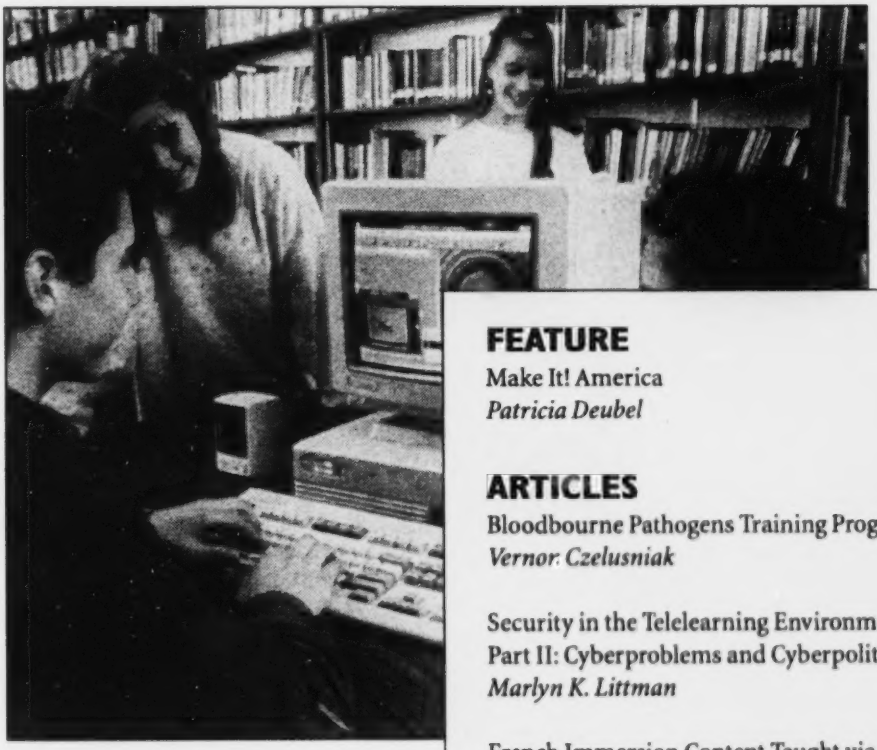
HyperNexus

MARCH 1998 VOLUME 8 NUMBER 2

JOURNAL OF HYPERMEDIA AND MULTIMEDIA STUDIES



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SOFTWARE THAT TEACHES

TRUDY ABRAMSON

A PROMISE NOT MET

FOR TWO DECADES, WE HAVE been reading that 90 to 95% of all educational software is a disappointment. The vendors make enormous promises for their wares, school districts invest money in hardware and software, and learning does not show measurable improvement. There are several reasons that account for this general lack of success. Teachers do not know how to turn software experiences into intellectual growth, software does not meet its purported goals and objectives, and software is just too full of bugs to be credible. To remedy the teaching/learning process problem, popularly called "integrating the software into the curriculum" requires extensive training and practice. To produce effective teaching/learning materials requires building goals and objectives into instructional software. To thoroughly debug software requires iterative proofing and modification until all the bugs are gone.

Alpha Testing

We often read about beta testing, the process of having members of the target audience use the software to help determine its functionality and usability. There is an earlier, less publicized process called alpha testing that is typically an ongoing check of navigation, spelling, sentence structure and general appearance. As consumers we want to believe that before multiple copies of a product are published and sold, the product has passed the alpha test with flying colors. Generally, the authors provide a one-page checklist for the testers with some space on the bottom for other comments. For an interactive multimedia product, the following items must be examined:

- Is every link (button, icon) dynamic?
- Does every link go where it should?
- Does the procedure linked to exist in the product?
- Can the user navigate through the system without becoming lost?
- Do the combinations of background and text colors and fonts make for a readable product?
- Are the spelling, grammar, and sentence structure correct?

These are necessary, minimal conditions that the user has a right to expect from a published product.

Beta Testing

Beta testing should be conducted following successful completion of alpha testing. The function of this test is to see whether the product meets its promise and the needs of the targeted population. Experience in teaching and training consistently shows that if the product is for people who word process, testing it on supervisors does not produce accurate results. Similarly, testing a second-grade program on teachers does not do the job. Until a publisher can honestly state that the product holds the interest the target audience and teaches that which it purports to teach, software cannot positively impact upon learning.

Do You Feel the Pain?

Not long ago, I received the following note from a conscientious doctoral student who was developing the next generation of education software as part of a distance learning team. The note is reprinted here verbatim; proper names have been changed.

> It should be noted that there were serious problems with the pack and go feature of PowerPoint '97. I spent many hours with Jane Doe on the phone and with Judy Roe (university technology trainer) trying to get the pack and go to work. First, I downloaded a service patch for Office '97. That did not solve the problem. After trying some diagnostics and reinstallations, I went back online and downloaded the updated PowerPoint '97 viewer. [My program] still would not play from the

pack and go feature. After much effort, Judy was able to get it to work. My initial plan was to run it on each of my alpha testers' machines, but the pack and go feature worked only on one machine. Fortunately for me, that tester was a good friend and allowed the other two alpha testers to test [my work] on his machine. Office '97 is an expensive software package. One would think a company as big and rich as Microsoft could put out flawless software.

The end of this story is that the author of this note assembled a totally plug-in-and-go program that ran effortlessly from the Zip disk on which it was stored. When I shared this message with an on-campus class, one highly experienced software user commented that we, the public, are today's beta testers. In this case, had the product been alpha tested, it would have been sent back to the drawing board because it simply did not work.

Publishing Time vs. People Time

Several years ago, George Fornshell, one of HyperNexus's consulting editors and a highly knowledgeable software expert, provided a rule of thumb, "Never purchase any software with a version number of 1.0." Now, that rule is for you and me, people who worry, "What am I doing wrong?" when software fails to meet its promise. George, on the other hand, is sufficiently confident in his own skills to know when he is at fault and when it is the software. The question remains as to why are imperfect products marketed.

Everything has to do with time. Products must get into the marketplace before the hardware that runs them becomes obsolete. Products must get into the marketplace before competitive ones become definitive solutions in a particular niche. Products try to reach the marketplace by the pre-announced publication dates. Products try to reach the marketplace in time for major technology shows such as Comdex. With all these pressures, who has time to consider accuracy?

An Unrealistic Solution?

How much time is invested trying to get imperfect software to work? Does my time and your time have any value at all? For argument sake, let us draft a new federal law. A purchaser who documents five software glitches in a product can return the product to the retailer or vendor and obtain a full refund. This scheme does not compensate the user for the lost amount of time invested trying to get the product to work correctly or, for many novice users, the loss of self-esteem. Back to the federal courts. Let us amend the above law to read, obtain a refund equal to twice the price of the product. This amendment still would not repay users for their time and stress, but sooner or later, it would probably make a difference. The software industry must experience pain before the prevalent behaviors will be changed. In the meantime, let the buyer beware!

IN THIS ISSUE

Volume 8 number 1 featured a *HyperNexus* NECC '97 contest winner and two two-part articles, one that addressed the design of technology-based adult learning environments and the other that discussed security issues in Web-based learning sites. Interactive multimedia and learning via the Web are the two hottest topics in educational technology today. *HyperNexus* is proud that state-of-the-art researchers have chosen to publish their work in our journal. Another contest winner's work is displayed. Also, find articles that address a range of grades, subjects and technology applications.

Paola Williams, HyperSIG Chair, announces a second annual contest: Multimedia Mania.

Patricia Deubel, who teaches advanced placement high school classes in Ohio, has found a software product that truly embodies all the events of instruction that make for successful learning. The product and the analysis are so exciting that what began as a software review has culminated in a scholarly article.

Continuing her research on telelearning, **Marlyn K. Littman**, a *HyperNexus* consulting editor and professor of information science and telecommunications, turns, at this time, to issues of cyberproblems and cyberpolitics.

Michelle Haj-Broussard, a teacher of young children and **Alex Roth**, a professor of teacher education, provide the young child focus to this issue. Their article describes how French Immersion kindergarten pupils learn the rudimentary workings of the Internet. At the same time, the children create one-page storybooks that develop their communication and creative thinking skills in the content area.

Our presentation of NECC '97 *HyperNexus* contest winners features representative screens from the work of **Vernon Czelusniak**, a corporate trainer. The product was developed with ToolBook Instructor II and is being delivered across cyberspace via a corporate Intranet.

Jill Harlamert created an elegant and informative PowerPoint presentation to accompany a technical review of a very popular trade book on the creation of multimedia applications. The text and screen presentation are featured here.

Due to editorial reluctance to cut any of the excellent articles, the second half of **Ron McFarland**'s instructional design article has been deferred until issue 3 of this volume. HN

NECC '98 CONTEST

PAOLA WILLIAMS

AT THE HYPERSIG MEETING, NECC '96, the membership voted to hold contests for teachers and students that would celebrate instructional uses of multimedia in the curriculum. Last year's winning software products that were displayed at NECC '97 that are featured in this volume.

Our new contest is a production of Caroline McCullen. Students and their teachers will be honored at NECC '98 as they share their projects and insights into teaching and learning with multimedia. Caroline has secured corporate funding to pay travel expenses for the winning teams. Winners will be notified in May 1998.

In January 1998, teams of students and teachers from all over the world were invited to select a multimedia tool and design an interactive project which would enhance the learning process. The contest is designed to challenge students and teachers to use the latest multimedia techniques to address instructional goals within the context of the existing curriculum. All projects will be subjected to rigorous review by an international panel of judges. Winning projects will be evaluated by a rubric that measures content, screen design, program design, and relation to curriculum. The contest results will provide what teachers need most: effective working models of multimedia projects that may be seamlessly integrated into an existing curriculum.

Each winning team's presentation consists of three parts:

1) students will present their winning project;
2) teachers will discuss the related content and curriculum; and
3) time for questions and answers.

One of the most exciting outcomes of the contest has been the creation of "multimedia presentation rubrics." Caroline, in collaboration with the North Carolina Department of Public Instruction, designed the rubrics for judging purposes of the contest. The exciting piece is that these rubrics can be used by all teachers in assessing student multimedia work. They are a great tool for evaluation. I strongly encourage you to go to the Web pages and print a copy for yourself and your students. They are divided into seven categories: Instructional Design, Organization of Content, Subject Knowledge, Graphical Design, Screen Design, and Use of Enhancements, such as video, audio and 3-D animation.

When students learn how to achieve excellence in their work, and the standard is set, they can set their goals to achieving attainable outcomes. Clear and concise objectives and goals make learning authentic to both the learner and the facilitator.

Our thanks go to those sponsors who have taken the initiative to partner with HyperSIG to make this contest and presentation at NECC '98 possible. They include HyperStudio and Digital Chisel by Pierian Springs Software.

I invite you to visit the Web site for Multimedia Mania at:

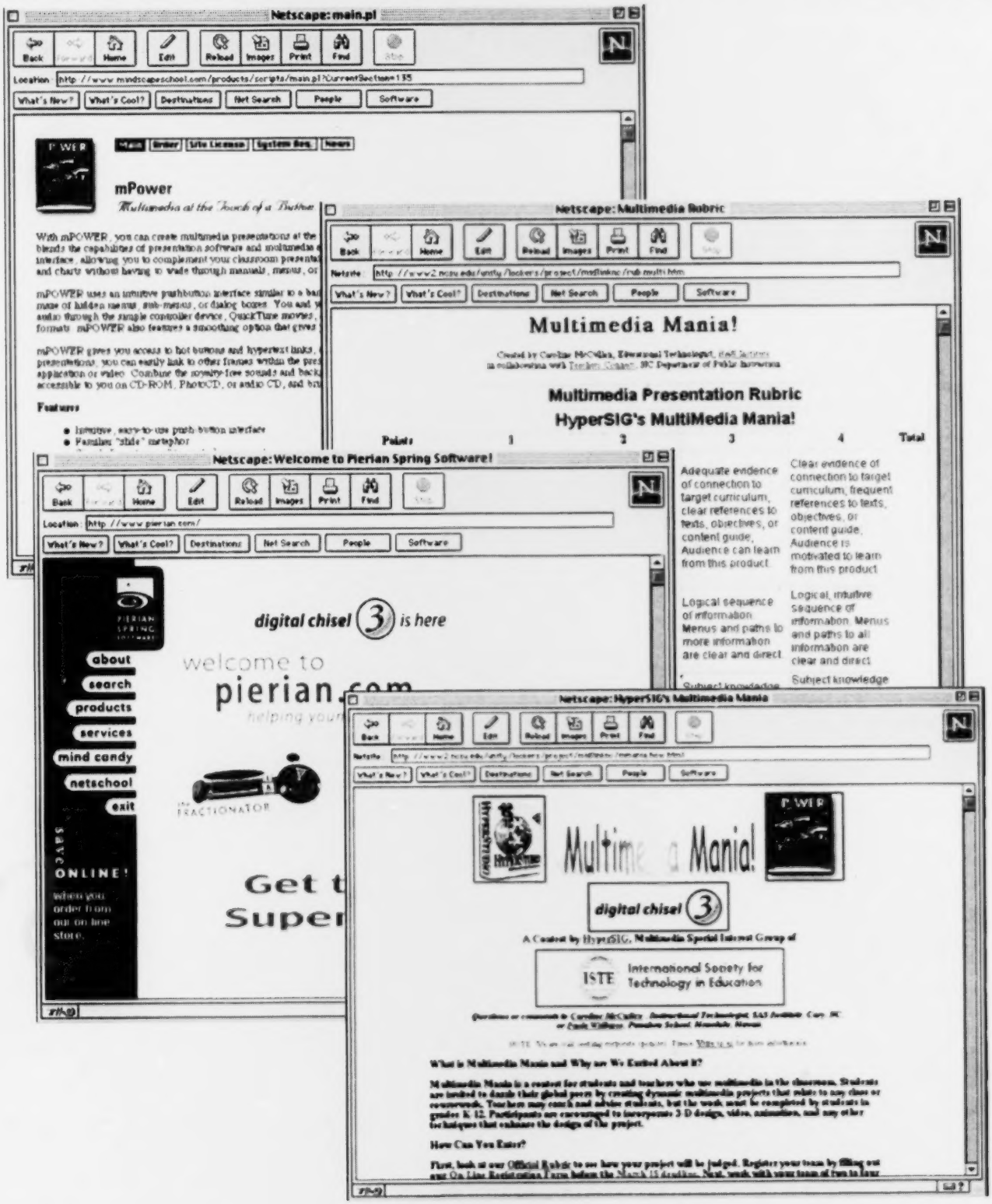
http://www2.ncsu.edu/unity/lockers/project/midlinknc/mmania.how.html

and to make plans to not only attend NECC '98 in San Diego this June, but to check out the ISTE Society Session on Multimedia Mania during the conference.

Enjoy this issue of *HyperNexus* and let us know how we can serve your needs.

Aloha,
Paola Williams HN

Paola Williams is president of HyperSIG and teaches at Punahou School, Honolulu, HI; pwilliams@lava.net.



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Make It! America

MAKE IT! AMERICA

Copyright: 1996, The Manufacturing Institute

Publisher and Address: The Mazer Corporation, P.O. Box 1400K, Dayton, OH 45413-9903

Subject: The World of Manufacturing

Theme: Tour manufacturing facilities, simulate running a business, investigate a range of careers. Design of the product is built on scenarios.

Target Audience: Secondary students

Learning: See, hear and do—this product meets all nine events of instruction as per Robert Gagne in his *Principles of Instructional Design* (1994, 4th edition)

Hardware for Windows:

- IBM-compatible with 386DX/33MHz(486SX/25MHz or better recommended)
- 6 MB free RAM (8 MB RAM or more preferred)
- MB free hard disk space
- Double-speed (2X) CD-ROM drive or better
- Minimum 640 x 480 display, 256 colors
- Sound Blaster sound card or 100% compatible
- MS-DOS version 5.0 or higher
- Windows 3.1 or higher
- QuickTime for Windows
- Microsoft-compatible mouse
- External speakers recommended
- Printer optional

Hardware for Macintosh:

Minimum requirements include processor LC475 and system 7.0 software

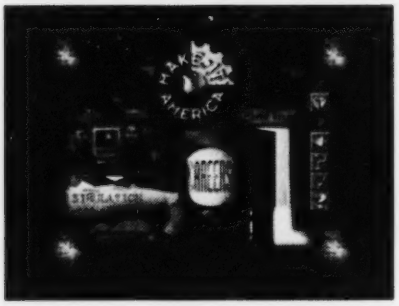
PATRICIA DEUBEL

KEYWORDS:
Multimedia Adventure, World of Manufacturing, Events of Instruction, Software That Teaches

MAKE IT! AMERICA IS AN INTERACTIVE multimedia educational adventure designed to introduce students to the world of manufacturing. This 1996 CD-ROM program for either a Mac or Windows environment was made possible by the National Association of Manufacturers and its educational affiliate, The Manufacturing Institute, with funding provided by ACX Technologies, ConAgra, Lucent Technologies, Merck & Company, PPG Industries, Sonoco Products, and Sony Digital Audio Disc Corporation. It is targeted for use primarily by secondary students who can work alone or as teams, but I found it has appeal for students in adult education programs. The educational approach is interdisciplinary, incorporating relevant subject matter from language arts, math, business, economics, technical education, and career development.

Research Commentary and Purpose. Research conducted by Szuprowicz, Fetterman, and Gupta has shown that humans retain only 20% of what they see, from 20% to 30% of what they hear, and about 40% to 50% of what they both see and hear. And they can retain up to 80% of what they see, hear, and do at the same time (Fluckiger, 1995, pp. 79-80). The implication for multimedia is that multimedia that provides a multisensory experience has an added benefit of maximizing learning. Use of multimedia changes the paradigm of learning from "standardization to customization." (Reigeluth, 1996, p. 14) The learner controls such factors as the time when the presentation begins, the order of exposure to the learning event, the speed of delivery, and the form of the presentation. Multimedia appeals to a broad range of intelligences. Much of what is learned in school is through verbal communications. But, Howard Gardner in his writings has identified at least seven multiple intelligences or ways of knowing. (Gardner, 1993) He has classified intelligences as verbal/linguistic, visual/spatial, mathematical/logical, musical/rhythmic, body/kinesthetic, intrapersonal, and interpersonal. General instruction using multimedia can be designed to incorporate learning activities that appeal to this broad range of intelligences. Events of instruction should be clearly identifiable. The purpose of this analysis is to determine how the software, *Make It! America*, adapts to different learning styles/theories and instructional modes. Gagne's (1992, p. 210) nine instructional events and a variety of instructional modes were identified in the analysis of *Make It! America*. These events appear in parentheses before each observation.

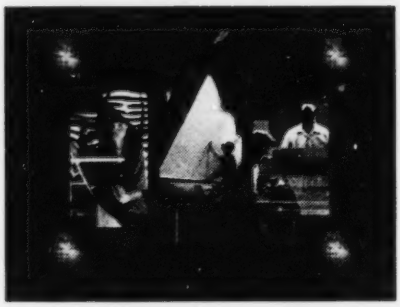
Program Description and Structure. (*Gaining attention*) As I began the program, I was greeted by an explosion of all the major components of multimedia—music, voice, color, photography, motion video, graphics, animation,



and text. (*Informing the learner of objectives*) When students begin the program, they are asked to enter their name and are given full instructions on how to use the program. Icons are explained. Three primary goals of the program are immediately stated. Students can tour manufacturing facilities, participate in simulations of running the companies, or investigate career opportunities in any order of their choice. (*Stimulating recall of requisite learning*) A glossary of manufacturing and business terms can be accessed at any time and can be printed. The details of each component follow.

(*Guided learning*) With *Make It! America*, students take multimedia tours of actual manufacturing sites at PPG Industries (dry laundry detergents), Sony (optical disks), or Chrysler Corporation (the Neon automobile) and witness various operations of these manufacturers with full audio and video support. (*Presenting stimuli with distinctive features*) At all three they can learn about finance, quality assurance, marketing, human resources, production, research and development, and logistics.

(*Eliciting Performance*) The most interactivity is seen when students involve themselves in simulations of running a business while developing their thinking and problem solving skills. Students are posed business decision-making scenarios and are given three choices about what they would do. (*Assessing Performance*) A chart appears on the lower left of the screen that is constantly assessing the performance of the company based on student choices. Students see either an increase or decrease in time allocations, cost, or quality of the product based on their decisions. The goal is to balance all three and stay in business. (*Providing Informative Feedback*) Depending on the choice, sometimes a person appears in the upper corner of the screen to comment on the business choice to provide guided learning and informative feedback. (*Enhancing retention and learning transfer*)



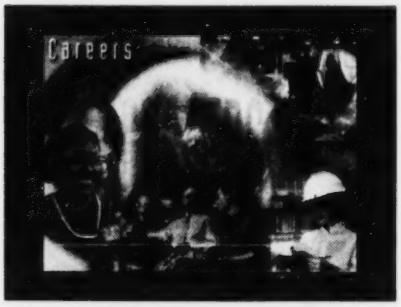
You can choose to store your score and repeat the process as many times as you wish in an attempt to run the company better or you can choose to try to run another business. This learning feature provides for enhancing retention of feedback statements and a transfer of learning to another scenario if the students choose to try again. You can also tell the program to save your location in case you would like to return to exactly where you were after quitting. This is useful for classrooms that might meet for only a 50-minute time period each day. The interactivity tests a knowledge base in math and economics as decisions are made.

(*Guided Learning*) Students can also explore manufacturing career opportunities and educational requirements by using the database designed for positions at several educational levels. They can learn about the last 100 years of manufacturing. (*Enhancing Retention and Learning Transfer*) A resource packet is included for further research by the student and tips for the teacher.

Observations with the Target Audience. The purpose of this observation was to determine if the content of the program and the reading level of the text presented were appropriate for the target audience. I tested this software with two grade 11-12 business vocational students, and found their initial reactions not as overwhelming as mine. These students have grown up with powerful television and movie experiences like "Star Wars" and playing highly interactive arcade games. For them the beginning presentation of the software was just another "expected" opening. They had no basis of comparison to "ho-hum" software. It was not until the simulation portion of the package that the students appreciated a new learning experience. They really "got into" a lively discussion of which choice to make on how to run a business. When the scale monitoring their decisions would ap-

pear, they would comment, "See, I told you that we should have made the other choice," or "Yes, we're finally making money!" They were disappointed at their first attempt to make decisions, but wanted to try again. At the end of their test of the software, both hoped their teacher would really use this. It was "cool." The young man said he "liked the

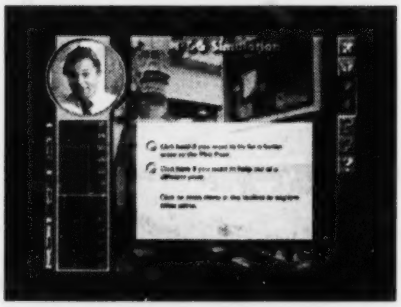
real business setting. It was easy to get from place to place, and it made him think (really think) about business decisions." The young lady added, "It gives me a good idea how corporate America works." They hoped the software would be used to prepare them for the vocational business competition in the spring. The potential for learning was clearly there. The students said the content of the software matched what they were learning in class. I observed that they had no difficulties understanding the text on the screens. The young lady



used the glossary for the definition of "marketing."

Layout. Screen layouts show a minimum of text per page, sometimes accompanied with an audio of the text. Images or graphics are full page or appear in rectangles, triangles, or circles, singular or multiple on a page. Sometimes they flash as in a slide-show. On certain screens, clicking anywhere will move you on. On other screens, specific icons are provided. At any time using the program, the user can click on a glossary of terms, ask for help, move forward or back, or go home, print, or quit the program. The flowchart used is clear.

Instructional/Learning Methodologies. The designers of this program have incorporated results from research that has shown humans can retain up to 80% of what they see, hear, and do at the same time. They have considered characteristics of the learning audience and have incorporated strategies that



appeal to multiple intelligences. The learning methodology employed followed Gagne's events of instruction, as indicated above. From the list of instructional methods provided in *The Occasional Trainer's Handbook* (1994, A49-A50), I note that the following methods were employed: *advanced organizers* to gain attention, *case studies* to provide a basis for asking questions during simulations, *field trips* to tour sites, *individual responses* when making choices, *lecture* when hearing about the company, *peer-assisted learning* opportunities when teams use the software and have *discussions* before entering choices, *programmed questions* following business scenarios, *time for reflection* in that the program stops and allows the user to think about responses. Used alone or in groups, the program provides *self-directed instruction* in that it is non-linear in its approach. Key to the entire multimedia presentation is the *simulation* method. These simulations permit the user teams to *role play* in operating the companies. *Coaching* is provided at times by speakers who tell the user he is doing a good job or needs to reconsider business strategies. *Drill* is provided when students go back and try again. Students will become more mature as they improve their decision making ability. The use of the program can form a basis for further research by students. Key to all of these methods is *performance*. Suggested resource materials are provided.

Conclusion. The opening research statements set the scene for the analysis of *Make It! America.* As I began the analysis of the software, my very first thought was, "Wow, this is fantastic!" I was immediately given a multisensory experience with an explosion of music, voice, color, photography, motion video, graphics, animation and text. My interest was maintained throughout the review, the events of instruction were clear, the program was easy to use. I conclude that *Make It! America* provides a powerful school-to-work initiative for students. It is also a very good model of instructional design for software developers.

REFERENCES

Bullard, R., Brewer, M., Gaubas, N., Gibson, A., Hyland, K., Sample. E. (1994). *The Occasional Trainer's Handbook.* New Jersey: Educational Technology Publications. ISBN: 0-87778-270-9.

Vilamil-Casanova, J. & Molina, L., (1996). An interactive guide to multimedia. "Clark: Rules for Instructional Interface Design" (p. 125) IN: Que Education and Training. ISBN: 1-57576-0665-5.

Fluckiger, F. (1995). *Understanding Networked Multimedia.* (pp. 79-80) New York: Prentice Hall.

Gagne, B., Briggs, L., & Wager, W. (1992). *Principles of Instructional Design.* (4th edition). (pp. 185-203). New York: Harcourt Brace Jovanovich.

Gardner, H. (1993). *Frames of Mind: The Theory of Multiple Intelligences/Tenth Anniversary Edition.* New York: Basic Books.

Reigeluth, D. (1996, May/June) A New Paradigm of ISD? *Educational Technology. 36*(3),13-20.

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BloodBourne Pathogens Training Program

VERNON L. CZELUSNIAK

KEYWORDS:
Blood,
Safety Issues,
OSHA Mandates,
HIV, HBV

THIS COMPUTER-BASED TRAINING program was designed to facilitate government-mandated training to workers who deal with potentially lethal blood products. The product, created with Asymetric's ToolBook Instructor II, is delivered across the country along a corporate Intranet to employees who are dispersed across the United States. This interactive, multimedia approach to corporate training is likely to become increasingly popular with the proliferation of online computers.

Field testing has tentatively indicated that the technology-based training is as effective as its predecessor that required travel to a corporate training site, the services of corporate trainers, and the expenses related to travel and hotel accommodations for the learners. To learn more about the product or its dissemination, contact the author at the address below.

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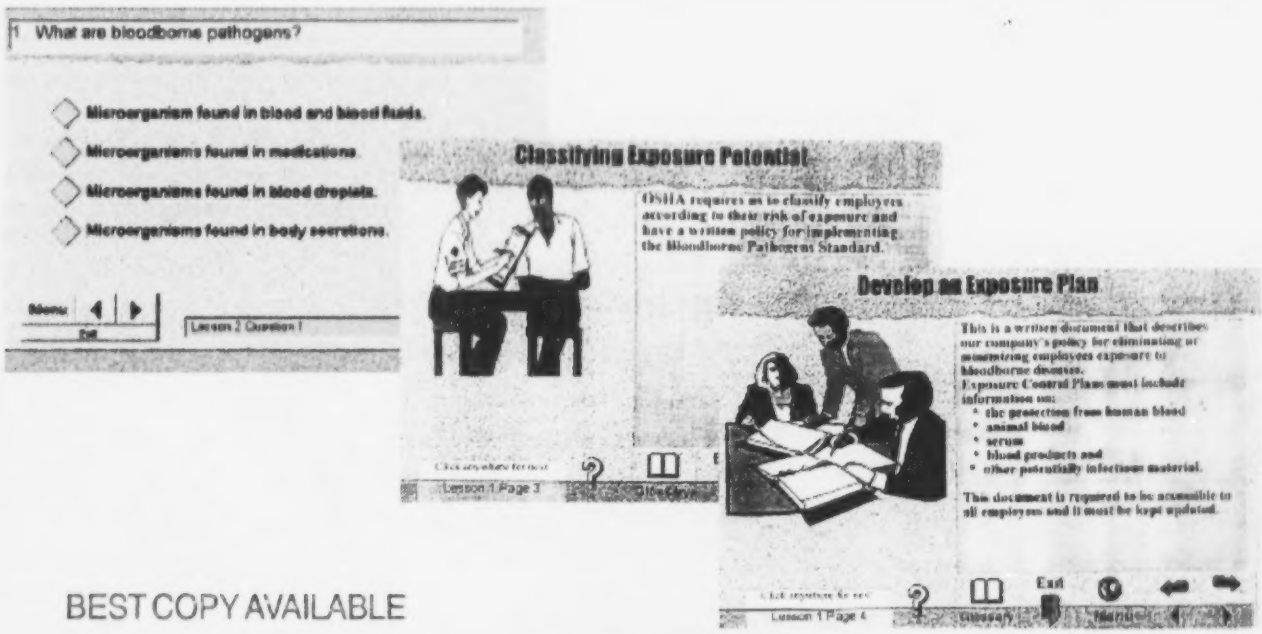
1 What are bloodborne pathogens?
Microorganism found in blood and blood fluids.
Microorganisms found in medications.
Microorganisms found in blood droplets.
Microorganisms found in body secretions.
Classifying Exposure Potential
Develop an Exposure Plan
Exit

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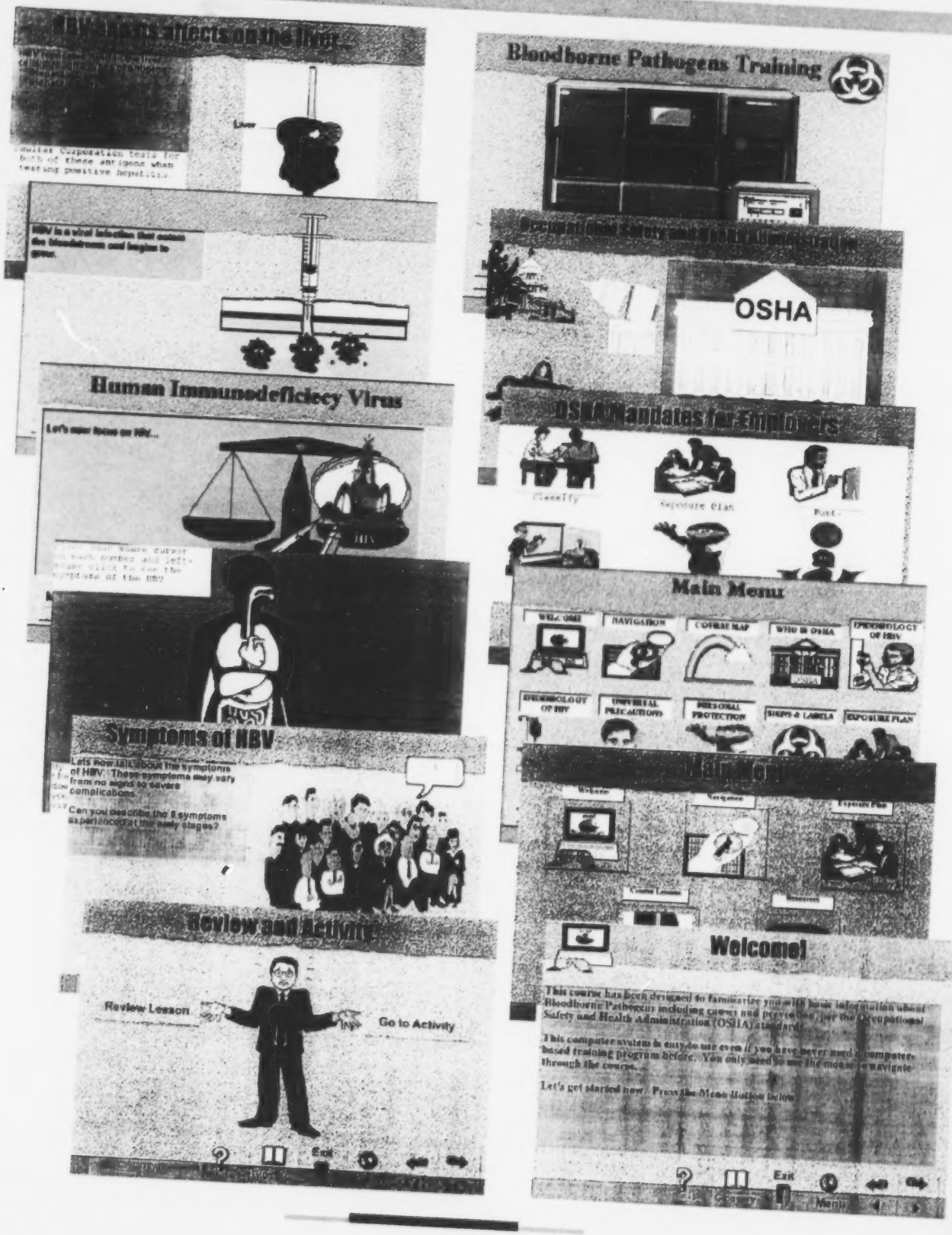

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Security in the Telelearning Environment

Part II: Cyberproblems and Cyberpolicies

MARLYN K. LITTMAN

KEYWORDS:
Accuracy, Harmful Content, Intrusion on Privacy, Acceptable Use Policies

Part I of this article examines strategies for addressing challenges associated with cyberintrusions (Littman, 1997). Procedures for implementing a security policy are introduced. Techniques for minimizing security vulnerabilities are noted. Tactics for deploying safeguards for network-based information access are reviewed.

Part II of this article focuses on procedures for dealing with harmful content on the Internet. Recent innovations in Acceptable Use Policies (AUPs) developed by schools and universities for governing utilization of Web-based materials and services are delineated. Strategies promoting a climate of trust that supports internetwork communications in the telelearning environment are examined. Mechanisms safeguarding information from unauthorized disclosure are described. Methods for rating Web-based information content are noted. Resources on censorship, cybersafety, intellectual freedom, and privacy are indicated.

DISTINGUISHED BY ITS SUPPORT of interlinked pages of text, images, and graphics and three-dimensional (3-D) virtual worlds, the Web facilitates the creation of innovative telelearning paradigms. However, in addition to resources for curricular enrichment and instruction, the Web also carries material that may be inaccurate, inappropriate, and misleading for certain audiences. From the perspective of the telelearning environment, Web deployment leads to questions such as the following:

- What are the consequences if middle school students exploring preapproved telelearning materials on World War II wander off the intended topic and inadvertently access sites containing Nazi propaganda and material on Holocaust denial and revision?
- What are the repercussions of accidentally or deliberately exposing young adults to Web-based bomb-making instructions, sexually exploitative pictures, obscene stories, and incitements to violence?
- Is it acceptable to challenge personal values and beliefs by providing free and unlimited access to all Internet resources?

Cyberproblems

Technical advancements are outpacing security options available to create protected internetworking environments. A French law requiring that opinion polls be kept secret during the week before a parliamentary vote was evaded by French Internet users who accessed Web sites where outcomes from opinion polls were posted anonymously.

The occurrence and number of cyberattacks ranging from interception of sensitive data to the insertion of misinformation are on the upswing. Recently, an alleged cracker using an account at the University of California at San Francisco invaded a San Diego Internet Service Provider's computing system and stole credit card information. Cybervandals broke into Web sites maintained by NASA (National Aeronautics and Space Association) and the NCAA (National Collegiate Athletic Association) and posted messages and racial slurs.

The capability to share resources on the Information Superhighway can be

accompanied by potential exposure to endangering relationships, politically incorrect sites, and erroneous information. Attempts to control freedom of expression on the Internet contribute to government intervention and censorship.

In Broward County, Florida, LEECH (Law Enforcement Efforts against Child Harm) proactively targets pedophiles online (Littman, 1996a). Pressures by the German government to ban child pornography and Nazi material resulted in temporarily blocking access to approximately 200 newsgroups on CompuServe. In China, Internet users are required to register with the police. The Ministry of Information and the Arts in Singapore plans to filter all national Internet use to prevent access to online resources that criticize the country's government, support religious divisiveness, and promote violence (http://www.eff.org/).

In Columbus, Ohio, parents holding membership in Citizens for Protection of Children petitioned the state legislature to implement Internet filtering tools and exclude access to sites with inappropriate content in a statewide computer communications network supporting connectivity of 700 public libraries to the Internet. A group of Ohio librarians claiming that use of these tools is a form of censorship opposed the effort.

Even if measures are taken to keep inappropriate Internet content out of the classroom, there is no guarantee that users will not find a way to access or provide links to resources on racism, fraud, and terrorism. In Broward County, Florida, teen-agers allegedly tried to blow up a parochial school with the aid of information on explosives downloaded from the Internet (Littman, 1996b). In Germany, an individual allegedly provided a link to a Web site that includes guidelines for sabotaging railway lines.

Problems with the use of the Internet prompt questions about the advisability of making it accessible to classroom users. Not all faculty members are supportive of including Internet access in the curriculum. Melvin Zeddies (personal communication, March 13, 1995), Dean of the Business and Technology Academy at Claremont High School in Claremont, California, indicated: "We have completely cut our students off the Internet unless their access takes place under direct physical supervision of a faculty member. In this way, they can't get in to the triple X stuff."

Even if measures are taken to keep inappropriate Internet content out of the classroom, there is no guarantee that users will not find a way to access or provide links to resources on racism, fraud, and terrorism.

Donald Hyatt (personal communication, March 15, 1995), Director of the Computer Systems Lab at Thomas Jefferson High School for Science and Technology in Alexandra, Virginia, related: "All students sign an agreement before they come on to the network indicating that they will abide by certain rules including respect for privacy and copyright. If students violate the policy, they lose access to the computing facilities."

If an instructor describes information posted at a specific Internet site as right or wrong, is this an unbalanced promotion of a personal point of view? Should youngsters be prevented from accessing content that may offend beliefs, values, and opinions? Is access prevention to online resources realistic or desirable?

B. R. Black (personal communication, March 15, 1995), Director of Information Technology of the Polk County (Florida) School System, remarked: "We must recognize that the Internet offers access to material that may not be suitable for school-aged children. We can't keep our schools bolted down like Fort Knox." According to Black, "We must find a reasonable balance in preparing our students to participate responsibly in a global information society."

Internet Controls

The capability to share ideas on the Information Superhighway can result in potential exposure to cyberporn. Pedophiles, pornographers, impostors, and criminals use the Internet but they also use other forms of communications including surface mail. How can educators teach children and young adults to follow the rules of the road in cyberspace? In what ways can colleges and universities promote responsible and ethical use of online resources?

Various tactics are available that promote user confidence in electronic information exchange, online dissemination of diverse viewpoints and ideas from a broad spectrum of information providers, non-discriminatory access to online technology, and responsible K–12 access to the Internet. These mechanisms vary in the extent of their support of the First Amendment and the primacy of free expression. However, their intent is to establish standards and guidelines that can readily be applied to a variety of systems, ensure universal access, support privacy of personal information, and allow individuals rather than governments exercise control over material viewed online.

PICS

In responding to widespread concerns about the proliferation of indecent, violent, or inappropriate material on the Internet, the World Wide Web Consortium (W3C), a coalition of international research and educational institutions, developed the Platform for Internet Content Selection (PICS) specification (http://www.w3.org/pub/WWW/PICS/). Designed to forestall government restriction on the free exchange of ideas on the Web, the PICS specification is composed of two components, namely, the rating system and the rating label.

The PICS rating system defines criteria for evaluating Web-based content. The PICS rating label is the actual rating information. This label appears on a Web page as part of the HTML (HyperText Markup Language) content or as part of the HTTP (HyperText Transfer Protocol) header.

A metalanguage based on the use of specified conventions, PICS provides the technical framework for monitoring and controlling access to Web-based resources. Through the use of PICS compatible client software that is either part of the Web browser or a separate application, information users can determine what levels of content can be viewed on the Internet without personally reading the content of each site.

The PICS specification supports Internet access without censorship controls. Internet content providers (ICPs) and Web site operators and authors must take the first step in submitting their content for assessment by a PICS compliant rating system. The system provides individuals with the necessary information for setting the computer to accept only material considered appropriate, thereby, eliminating the need for formal legislation.

PICS is the industry recognized standard for rating and advisory systems to be used on the Web. This specification is supported by a wide range of public and non-profit agencies, service providers, publishers, third parties, and consortia including America Online, Time Warner, and Netscape Communications Corporation. Microsoft Corporation bundles PICS capabilities with the Content Advisor feature of Internet Explorer (http://www.graphcomp.com/info/specs/ms/pics.html).

RSACi

Mounting concern about offensive Internet content and the possibilities of government censorship also motivated the Recreational Software Advisory Council (RSAC) to develop RSACi or RSAC on the Internet (http://www.rsac.org/). This content labeling advisory system enables parents, teachers, and administrators to determine what is permissible to be experienced on the Internet based on detailed information about the site's content provided in answers to a questionnaire that the Webmaster or ICP completes at RSAC's home page. The questionnaire features specific questions covering the nature, level, and intensity of the violence, offensive language, sex, and nudity contained within the site. After each Web page is assigned a rating label, Web browser software can be set to block pages that include material that is hateful, violent, or otherwise inappropriate. RSACi is compatible with the PICS specification.

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RSAC is an independent non-profit organization established in 1994 by a group of trade organizations under the leadership of the Software Publishers Association. The original RSAC system was created by a team of educators in response to the threat of Congressional legislation for controlling the computer game market.

In the United Kingdom, the Internet Watch Foundation endorses PICS and the RSACi rating schemes. This consortium promotes the use of PICs enabled software for accessing Web pages, encourages users to rate their Web-based content, and supports the removal of Web resources that are persistently and deliberately misrated or contain child pornography or other illegal material.

Internet Filtering Tools or Censorware

Internet filtering tools such as InterGo, Cyber Patrol, SurfWatch, Net Nanny, Net Shepherd, and Cybersitter permit access to the Internet at large but attempt to block access to Web sites with material judged offensive (http:// www.csolve.net/censorware.html). Designed to facilitate safe surfing, these tools allow the management of Internet activities by parents and educators; limit the total time spent online; and prohibit access to Internet newsgroups, forums, and predefined lists of Web sites compiled by the programs' publishers and producers. SurfWatch and Cyber Patrol are among the content filtering programs that also support the PICS initiative and RSACi advisory system.

Sites that are blocked by Internet filtering tools typically feature themes pertaining to violence, hate, drugs, alcohol, gambling, and sex (http:// www.handiware.com/educate /). Their content includes explicit depictions or

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images of sexual acts and Satanic rituals; encouragement of extreme cruelty, abuse, and extermination of specified populations; glamorization of illegal and addictive drug and alcohol use; and encouragement of online gambling and betting (http://www.surfwatch.com/).

How reliable are Internet filtering tools in prohibiting access to banned sites while promoting curricular enrichment? Many critics opposed to their use refer to these products as censorware (http://www.wired.com/).

Kay Vandergrift (personal communication, May 19, 1997), professor at Rutgers University, related: "Ironically, some of the most positive learning sites are filtered out using such software. For example, Cyber Patrol blocks access to the Ontario Religious Tolerance Site because it includes Wicca among its 62 religious and ethical systems and material on abortion, cults, and the death penalty."

Cyber Patrol also blocked access to material relating to a text on Internet censorship titled **Sex, Laws, and Cyberspace** by Jonathan Wallace and Mark Managan (Henry Holt, 1996). Wallace notes that the Boston Public Library (BPL) circulated hard copies of the book at six branch libraries. However, with the installation of Cyber Patrol on computers maintained by the BPL system, library patrons were temporarily prevented from reviewing a text outline posted at the authors' Web site because the word "sex" appears in the title (http://www.spectacle.org/cs/cp.html).

Instructional resources blocked by Internet filtering tools include the Electronic Frontier Foundation's Archives and Nizkor, a Web-based resource featuring extensive material on the Holocaust (http://www2.ca.nizkor.org/). Web sites maintained by the National Organization for Women, PeaceFire, a student organization opposing censorship, and the International Gay and Lesbian Human Rights Commission appear on rejection lists as well. Additionally, the Penal Lexicon, a site created to raise awareness of prison conditions in Great Britain, Envirolink, a corporate resource featuring information posted by environmental and animal rights groups, and *The Ethical Spectacle*, a monthly Web publication examining issues associated with ethics, law, and politics, have been ruled unsuitable as well (http://www.spectacle.org/).

Linn Boswell (personal communication, October 28, 1995), Computer Specialist at Eagle Ridge Elementary School in Phoenix, Arizona, cautions users interested in implementing these products. He said: "Cyber Patrol locked me out of my own school home page. Plus, when I experimented, Cyber Patrol let me go directly to the Playboy Web site."

[A]dults have an ethical responsibility to instruct students on how to protect themselves from dangerous Internet encounters.

Are reports of cybercrimes valid reasons to stop using the Internet? Should the focus of Internet access be on techniques for controlling the information environment? In commenting on the policies of some school districts supporting censorware deployment for controlling Internet access, Mary K. Chelton (personal communication, March 5, 1995), associate editor of *Voice of Youth Advocates*, stated: "It amazes me there is an automatic assumption that if students are allowed unfettered access to the Internet, they will directly access forbidden material on alt.sex.practices as if nothing else of interest is available." Chelton maintains that adults have an ethical responsibility to instruct students on how to protect themselves from dangerous Internet encounters.

Defining Harmful Content on the Internet

The Internet holds tremendous promise but also raises difficult issues that require frank reflection. Can youngsters be prevented from accessing online materials that are controversial? Is censorship the answer? What options are available? Who decides what is acceptable in a particular setting? Who sets community standards? Individuals surfing the Internet who inadvertently look at sexually explicit images may find automated copies of these graphics indefinitely stored on their hard drives. Are these individuals then guilty of possession of pornographic images placed on their PCs without their consent?

Nationally, the definition of information considered offensive varies from community to community and state to state. According to the American Civil Liberties Union (ACLU), states active in this arena such as Maryland, New York, Oklahoma, Georgia, and Virginia have passed or are reviewing laws to restrict access to Internet resources (http://www.aclu.org/).

Recently, the ACLU filed a challenge to a Virginia law that bans state employees from viewing sexually explicit communications online. According to the ACLU, the law unconstitutionally limits First Amendment rights and academic freedoms of university professors at state colleges and universities by preventing them from accessing materials on Web sites that they could access without restraint in any state university library (http://www.aclu.org/).

Acceptable Use Policies

In the school and university environment, AUPs (Acceptable Use Policies) are effective mechanisms for promoting Intranet and extranet use in a manner that is consistent with instructional and research goals and objectives (Littman, 1995). Generally, AUPs include guidelines for online communications, resource sharing, and information retrieval and indicate sanctions for violations and misuse.

My research to date indicates that AUPs reflect institutional philosophy, mission, goals, and objectives in establishing ground rules and constraints for regulating faculty, student, administrative, and staff use of computing resources. Typically, individuals are advised that use of their institutional accounts must conform to ethical and legal standards and protocols.

Beverly Cameron (personal communication, October 10, 1995), teacher/trainer at American High School in Hialeah, Florida, said: "We believe that the value of information and interaction on the Internet supersedes the possibility of inappropriate usage." In order to access the Internet from American High School, each student signs an AUP and agrees to use the school-based account for educational activities. Malicious destruction or modification of data, transmission of racist and obscene material, copyright violations, and the use of abusive language can culminate in the cancellation of Internet privileges.

The Leon County School District, Newport-Mesa Unified School District, Grossmont Union High School District, and Saddleback Valley Unified School District require students to complete a network-access orientation session. Students and their parents or guardians then sign an agreement acknowledging that connections on the Internet can be used only for purposes consistent with the approved curriculum (http://www.etc.sccoe.k12.ca.us/caltip/aups.html). Failure to abide by regulations is handled through sanctions and a disciplinary process that includes suspension and/or revocation of access privileges, school suspension and expulsion, and legal action and prosecution by the authorities.

The Catholic University of America has developed a series of policies that apply to personal home pages posted on the university's Web site (http://www.cua.edu/). Authenticated users are advised that their home pages must not infringe upon the rights of other students, staff, faculty, or university guests; create a volume of network traffic that interferes with normal activities of the university community; or include pornography, blasphemy or inappropriate advocacy. Home pages in violation of these policies are removed from the Web site.

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The University of Michigan maintains a Web site that features guidelines relating to the ethical, legal, and proper use of computing resources, password security, e-mail privacy, and the consequence of sending chain e-mail (http://www.umich.edu/~itdua/). Members of the university community are advised that, whenever they use institutional computing services, they must abide by all general university policies and procedures and respect the privacy and rights of other users, the legal protection provided by copyright and program licensure, and the integrity of the network.

In its AUP, the University of Delaware points out that access to computing facilities is a privilege granted to authenticated users for school related activities (http://www.udel.edu/). Susan Allmedinger (personal communications, October 10, 1995), assistant director for Systems Security and Access at the University of Delaware, commented: "Our students are expected to adhere to our policy for responsible computing and respect the rights of others in using computing resources." She noted that any breach of AUP regulations is subject to disciplinary procedures. To demonstrate their understanding of the university's policy for responsible computing, all individuals using the university's computing and information resources must take the Electronic Community Citizenship Examination (ECCE) prior to activating their computer accounts (http://www.udel.edu/eileen/Ecce/instruct.html).

TENET (Texas Education NETwork) supports educational excellence and innovation in Texas by providing a comprehensive statewide communications infrastructure. Educators accessing internetwork resources via TENET are advised that playing games such as Multi-User Dungeons and Dragons or retrieving pornographic material via such utilities as IRC (Internet Relay Chat) can result in revocation of their TENET membership (http://www.tenet.edu/).

JANET (Joint Academic NETwork) is the collection of networking services

and facilities that support the communications requirements of the education and research communities in England, Scotland, and Wales. UKERNA (United Kingdom Education and Research Networking Association) is responsible for the provision of the JANET service and management of the JANET Acceptable Use Policy (http://www.ja.net/documents/use.html). UK institutions that use JANET for internetworking comply with guidelines that regulate information access and transmission.

In particular, individuals utilizing JANET may not create or transmit offensive, obscene, or indecent images or data; defamatory information; and unsolicited commercial or advertising material. They are further advised that violating the privacy of other users, corrupting or destroying data, and wasting staff effort or networked resources through denial of service or other misconduct such as the introduction of viruses can lead to an indefinite withdrawal of service after appropriate warnings have been given by UKERNA. Service restoration is only made when UKERNA is satisfied that appropriate steps are taken at the institution involved to ensure acceptable behavior in the future.

UKERNA members such as Anglia Polytechnic University and the Queens University of Belfast have developed guidelines based on the JANET AUP. For instance, at Anglia Polytechnic University users are advised that sending offensive or unnecessary messages, disruption of service through the introduction of a virus, unauthorized use of system facilities to permit one user to masquerade as another, and similar acts will result in disciplinary action (http://bridge.anglia.ac.uk/).

The Queen's University of Belfast advises the university community that information available from the institutional network servers should reflect the work and ethos of the university both in content and quality of presentation. Individuals are further advised that if they publish or transmit offensive material and abuse copyright and data protection policies, they will be subject to disciplinary procedures (http://www.qub.ac.uk/).

Electronic Monitoring Tools

A new generation of electronic monitoring tools called caching proxy servers track wasteful or inappropriate use of network resources. Designed to troubleshoot network bottlenecks and performance slow-downs and predict response time of WAN (wide area network) applications, caching proxy servers also document an individual's activities on the Web and selectively grant or block access to Web resources.

A new generation of electronic monitoring tools called caching proxy servers track wasteful or inappropriate use of network resources.

Netscape Proxy Server filters content and controls access to information internally on an institutional Intranet and externally on the Internet (http://form.netscape.com/comprod/announce/). This tool also supports virus detection and encryption.

Sequel Technology's Sequel Net Access Manager provides detailed reporting on user activities and can be configured to prevent, limit, or enable access to newsgroups, e-mail, and online services such as America Online (http://206.63.117.1/news/). To help alleviate fears about infringement of personal privacy rights, Sequel notifies potential clients that they can legally monitor network usage as long as their employees are notified in advance.

Optimal Networks' Optimal Internet Monitor tracks network usage and behavior of users in real-time (http://www.oni.com/). This network modeling package generates detailed reports, charts, and accounts of network activities. SilverStone Software Corporation provides management and software tools for use in the home and workplace to track each user's computer activities with text-based documentation and random screen captures. Webster Network Strategies supports WebTrack software for logging details on Web sites visited by employees (http://www.e-land.com/e-news_pages/corporate_censor.html).

Are electronic monitoring tools a viable alternative to censorship? Once the software is installed, are children less likely to misuse their computers because they know what they do may be monitored at any time? Is monitoring technology a valid or misdirected approach? Should institutions restrict access to specified Web sites? Should guidelines be developed for work related Web surfing? Should staff behavior be clandestinely observed to verify compliance with institutional policies? These questions form the core of a growing debate about provision of unlimited access to Web sites in the school, university, work, and home environments.

The Electronic Frontier Foundation and the Communications Decency Act

Comprehensive materials on censorship and intellectual freedom are available from the Electronic Frontier Foundation (EFF), a non-profit civil liberties organization vigorously working in the public interest to safeguard free expression, privacy, and access to information and public resources (http://www.

eff.org/). The EFF is committed to defending civil liberties in the world of computer communications and files lawsuits against legislation threatening First Amendment rights such as the Communications Decency Act (CDA), a specification included as part of the Telecommunication Reform Bill passed by Congress and signed by President Bill Clinton on February 1, 1996.

The CDA criminalizes the transmission, posting, and distribution of indecent material to FTP (File Transfer Protocol) sites, the World Wide Web, and Usenet newsgroups. Provisions also cover private e-mail and online chat room communications exchanged with anyone under 18 years of age. Those convicted of violations may be punished with $250,000 fines and two-year prison terms. According to the EFF, parents and not governmental agencies have the right and responsibility to determine what reading material is appropriate for their children to see; and adults have the right to choose what to read and with whom to associate. The EFF further notes that, since CDA does not clearly define "obscene," communications systems operators and providers are left open to prosecution under diverse community standards.

To illustrate the potential impact of the Communications Decency Act in abrogating civil liberties, the EFF compiled a list of endangered sites. These sites feature information on the Gay and Lesbian Alliance, the Sistine Chapel, Michelangelo's *David*, Botticelli's *The Birth of Venus*, Mark Twain's *The Adventures of Huckleberry Finn*, Upton Sinclair's *The Jungle*, and *The King James Bible*. Endangered Web resources in the health care field include those sites containing material on Prozac, HIV/AIDS, breast cancer, breast feeding, safe sex, family planning, and the Supreme Court's Decision in Roe v. Wade.

On June 26, 1997, the United States Supreme Court ruled unanimously that CDA censorship provisions of the Telecommunications Reform Act of 1996 regarding indecent content are unconstitutional and that free speech on the Internet and in online forums deserves the highest standards of Constitutional protection. The broad impact of the CDA is reflected in the range of plaintiffs that joined together under the leadership of the EFF in challenging the constitutionality of the legislation. This coalition included the American Library Association, American Civil Liberties Union, the Electronic Privacy Information Center, Barnes & Noble, Apple, and Microsoft (http://www.eff.org).

The Internet provides a wide range of resources on intellectual freedom, censorship, privacy, and cybersafety.

Resources on Intellectual Freedom, Censorship, Privacy, and Cybersafety

The Internet provides a wide range of resources on intellectual freedom, censorship, privacy, and cybersafety. Created to oppose passage of the CDA, the Citizens Internet Empowerment Coalition (CIEC) tracks Supreme Court Cases and appeals threatening the use of the Internet as a viable means of education, commerce, and free expression and issues alerts and bulletins to its constituency (http://www.ciec.org/).

Online service providers such as America Online, CompuServe, and Microsoft are initiating a campaign called Project OPEN (Online Public Education Network) to inform users about their intellectual property rights and tactics for privacy and consumer protection on the Internet. Resources on online censorship and the right to privacy in cyberspace are maintained by Electronic Frontier Canada (http://www.efc.ca/) and Electronic Frontier Australia (http://www.efa.org.au/).

The Electronic Privacy Information Coalition (EPIC) maintains resources on the use of interactive online services and cybersafety as well as news on court cases and pending litigation relating to the National Information Infrastructure and Freedom of Information Act (http://www.epic.com/). Sponsored by the Computer Professionals for Social Responsibility and the Fund for Constitutional Government, EPIC conducts policy research on national and international privacy issues as well.

The National Coalition Against Censorship (NCAC) counters censorship efforts in schools and libraries, opposes restraints on information access and open communications, and defends First Amendment values of freedom of inquiry, thought, and expression (http://www.ncac.org/homej.htm). NCAC is an alliance of literary, religious, artistic, educational, labor, and civil liberties groups. PeaceFire represents students' interests in the debate over freedom of speech on the Internet (http://peacefire.org/info/faq.shtml).

Web sites maintained by CAFE (Coalition for Academic Freedom of Expression) at Carnegie Mellon University and SAFE (Student Association for Freedom of Expression) at MIT (Massachusetts Institute of Technology) include material on freedom of expression, drugs, banned books, censorship, and banned newsgroups (http://www.cs.cmu.edu/~café; http://www. mit.edu/). CACI (Children Accessing Controversial Information) is an electronic forum featuring debates on censorship issues and the imposition of government regulations on the content of communications (http://www.zen.org/~brendan/caci.html).

The Center for Democracy and Technology (CDT) supports public poli-

cies that promote constitutional civil liberties and democratic values in cyberspace as well (http://www.cdt.org/). In a recent development, the CDT sponsored a series of forums to discuss safeguards and authentication mechanisms needed by the Social Security Administration to securely provide transaction services on the Internet. These forums were held in response to concerns expressed by privacy advocates and the public about the Social Security Administration's online publication of an individual's personal earnings and benefit estimate statement (http://www.cdt.org/privacy/pers_info/ssa.html).

CyberAngels, a volunteer Internet safety organization staffed by members of the International Alliance of Guardian Angles, unites users in more than 30 countries in an effort to fight Internet crime and protect children from criminal abuse. CyberAngels patrol the Internet through participation in the global Cyberspace Neighborhood Watch project and provide assistance to online victims of cyberstalking, harassment, hate mail, and sexual mistreatment (http://www.cyberangels.org/). Tips for personal safety are reflected in the group's CyberStreetSmarts initiative.

The National Center for Missing and Exploited Children has created a Web-based brochure featuring guidelines for making the Internet safe for young surfers (http://www.missingkids.org/). CAUSE, a consortium of academic institutions, maintains an Information Resources Library focusing on subjects such as censorship, free speech, acceptable use, copyright, and intellectual property for helping educational institutions effectively deal with sensitive issues sparked by the explosive growth of internetworking (http://cause-www.colorado.edu/).

The American Library Association offers guidelines for helping parents keep youngsters safe online (http://www.ala.org/). Designed specifically for youngsters surfing the Internet, the Notes, Advice, and Warnings site features information on handling unwanted credit card solicitations and controversial e-mail (http://www.crc.rich.com/~steve/warm-kids.html).

Conclusion

The Internet carries content that clearly contributes to curricular enrichment and enhancement. Yet, it also includes potentially harmful and illegal material that can be misused for criminal activities, discrimination, and incitement to violence. The capability to share resources and ideas on the Information Superhighway can be accompanied by potential exposure to endangering relationships and pornography. The benefits of the Internet far outweigh its negative aspects but these aspects cannot be ignored.

Alerting students, faculty, administrators, and staff to guidelines for cybersafety involves multiple approaches. Deployment of a security policy containing guidelines for safeguarding information resources protects the integrity and authenticity of networked data. Implementation of procedures, mechanisms, tools, and techniques such as passwords, encryption, digital signatures, and firewalls for safeguarding information from unauthorized disclosure creates a climate of trust for internetworking activities. Articulation of an acceptable use policy (AUP) supports ethical conduct in cyberspace, clarifies Web-based access rights and privileges for network users that are consistent with institutional goals and objectives, and facilitates responsible utilization of Internet resources in the telelearning environment. HN

REFERENCES

Littman, M. K. (1997). Security in the telelearning environment. Part I: Cyberinvasions and countermeasures. *Hypernexus: Journal of Hypermedia and Multimedia Studies, 7.* In press.

Littman, M. K. (1996a). Guidelines for network security in the learning environment. *Journal of Instruction Delivery Systems, 10* (1), 35-40.

Littman, M. K. (1996b). Protecting electronic data: A losing battle? In J. Varlejs (Ed.), *Safeguarding Electronic Information* (pp. 20-33). Jefferson, NC and London: McFarland & Co., Inc.

Littman, M. K. (1995). The perils of network security. In M. E. Williams (Ed.), *Proceedings of the Sixteenth National Online Meeting* (pp. 275-284). Medford, NJ: Learned Information.

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French Immersion Content Taught via the Internet:

A Multi-Disciplinary Activity on Louisiana Birds

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KEYWORDS:
Early Childhood,
Natural Sciences,
Internet Literacy,
Enhanced Learning

ABSTRACT

AT THE KINDERGARTEN LEVEL, simply asking students to search and print using a WWW browser is not a feasible lesson. This is especially true in French Immersion kindergarten that stipulates that lessons be taught in French, a language that is new to the students. A teacher-created Web page allows teachers to tailor activities according to the students' academic needs and linguistic abilities. This particular lesson allows French Immersion kindergarten students to learn the rudimentary workings of the Internet while creating a one-page storybook that develops their communication and creative thinking skills in the content area.

French Immersion Content Taught via the Internet: A Multi-Disciplinary Activity on Louisiana Birds

This cumulative lesson incorporates computer/Internet skills, problem solving skills, graphic design and communication skills, and creative thinking skills in the content area of natural sciences. Combining these content areas increases the level of instructional demand on the student. The goal is more than simply achieving Internet literacy, students not only find information on the Web pages but also cut-and-paste images and develop a storybook. By combining the content and the computer literacy objectives into one activity, the students get a more in-depth experience without the time and complications that teaching each objective individually would entail.

Critics might question the logic of introducing students to the Internet at the early age of five, but kindergarten students can quickly learn the working of computers. If Internet access is available at the kindergarten level then it is most likely available at the higher grade levels. Since kindergarten is the level at which one is taught the basic workings of school life, such as standing in line, using school supplies, and using the computer, why would the skill of using the Internet be excluded? Starting kindergartners with computer literacy activities, especially when integrated in content area lessons, has great potential for their long term computer usage.

Another critique for teaching Internet literacy at such a young age is that there are already so many objectives at the kindergarten level and students could be easily overwhelmed. For example, there are more than 50 kindergarten language arts, math, and science objectives (Lafayette Parish School System, 1995a). In the French immersion programs, kindergartners have to accomplish all of these objectives in addition to the language arts objectives for immersion. Language arts objectives for

kindergartners entail 38 additional objectives (Lafayette Parish School System, 1995b). The sheer quantity of required objectives have compelled second language immersion teachers to become adept at integrating subject matter using whatever mediums available to them. The Internet enables students use their visual, aural, and creative processes in a new medium. Using every possible modality and medium is considered a major language teaching principle (Rivers, 1989).

A teacher-created Web page allows the teacher to control the links and languages to which the child has access.

This activity uses the teacher-created Web page to control the Internet environment of the child. Restricted Internet activities lend feasibility to the project. There are numerous reasons why restrictions are needed at the kindergarten level. The first and most significant is the immersion kindergarten students difficulty in comprehending the written word. A teacher-created Web page allows the teacher to design a lesson that would not overwhelm the children in terms of language. The teacher can create an environment in which contains language that is just a little beyond her or his students' level of competency. This would allow the students to understand the activity while acquiring the language without too much frustration (Krashen, 1982). For example, in this lesson the language content the students will be learning entails telling others what their name is and where they live. Each bird tells the students their name and where they live but they do it using a variety of expressions. Although students understand from the context what the bird is saying, this particular arrangement of words may be new to them. Because these expressions are not too unfamiliar, the students quickly pick them up without frustration.

Another reason for creating activities on a Web page is to limit students access to unwanted information. In French Immersion, unwanted information includes sites that are in English. A teacher-created Web page allows the teacher to control the links and languages to which the child has access. It also reduces the possibility of a child happening upon questionable sites. A teacher-created Web page gives teachers a reassuring measure of control in their classroom.

Figure A. Example of student cut-and-paste activity.

Setting up the Activity

The basic requirements for this application of technology to teaching in the subject areas is a computer that has access to the net over a high-speed connection and two pieces of software. The two required pieces of software are a word processor and a Web browser, such as Netscape Gold, which has an easy-to-use tool to create home pages. The home page can include activities using images and audio, storybooks, and links to related sites. This activity will include all of the above.

Running the Activity

Before using the Internet as a reference tool, and in place of printing directing from the browser, students need to develop the skill of copying text and graphics from WWW pages and pasting them into word-processing documents. This procedure allows the information selected from the WWW to be

stored in the word processor documents until it can be used later in the project.

The first step in running the lesson is to give students a creative-thinking question. "If you were a bird, what kind of bird would you like to be?" was the question chosen for this activity. The question focuses the students' attention and functions as a way to organize their problem-solving efforts.

Students are first directed to the word processing file where they type their names on their storybook templates. This process involves a little typing, but most kindergartners can spell their names and find the letters on a keyboard. The purpose of this template step is to link the four elements of activity together and to move students into the construction mode.

They are then directed to the lesson home page. The home page has the lesson question as its title. Underneath the title are the birds from which the students will choose. Students click on their bird of choice, then copy and paste the image of it next to the number one in the storybook template in the word-processing program (see Figure A). Students then click on the birds name to see a written description of the bird. They then click on the descriptive sentence that tells them where the bird lives to continue their research. This will lead them to a page with an image of the bird's habitat. The image of this habitat is then copied and pasted onto the storybook template next to the number two. The template is then printed out and given to the student. Next to number three the students then draw a picture of what they think the birds parents look like (hopefully it won't be much different from the bird), and next to number four they draw what they think its nest looks like in its natural habitat. After completing the research and the artwork, the students assemble their storybook and read it to the class. The storybooks will then be scanned and placed on the classes homepage or exchanged with other French Immersion keypals.

Before using the Internet as a reference tool, and in place of printing directing from the browser, students need to develop the skill of copying text and graphics from WWW pages and pasting them into word-processing documents.

Many Uses for this Activity

Considering all of the goals and objectives that need to be met throughout the school year, French Immersion teachers can have difficulties in coordinating language instruction and subject content. Adding computers to the mix can complicate the instructional system and can be problematic if these curriculum objectives are not kept in focus. This activity combines browsing on the net, designing and developing of storybooks, with the research of content area in order to accomplish as many objectives as possible.

Students can use the Internet as a tool in every subject area. Whether the activity is a major part of a class assignment or an enrichment activity, it helps to have the students not only find the information and copy it into an accessible format, but then use it in an activity where the content information is the focus. In addition, after one class makes these storybooks, the information can be used by other students as information sources.

It is the creation of a storybook that makes this lesson a more complex activity. There are many ways to increase the level of instructional demand on the students during WWW browser activities. The most important method is to build a creative thinking and problem solving steps into the activity. By asking the students to use the information they find on the net, it moves the lesson beyond hunting and pecking.

REFERENCES

Lafayette Parish School System. (1995a). *Needs to know; Language arts-math-science.* Lafayette, LA: Author.

Lafayette Parish Public School System. (1995b). *French immersion curriculum guide; Grades K–3.* Lafayette, LA: Author.

Krashen, S. (1982). *Principles and practice in second language acquisition.* Oxford: Pergamon Press.

Rivers, W. M. (1989). *Ten principles of interactive language learning and teaching.* Washington DC: National Foreign Language Center. (ERIC Document Reproduction Service No. ED320438)

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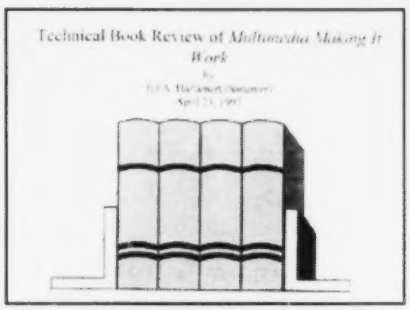
A Technical Book Review

Multimedia: Making It Work
by Tay Vaughan



JILL A. HARLAMERT

KEYWORDS:
Multimedia Development, Hardware, Software, Building Blocks

INTRODUCTION

The computer field has exploded in the 1990s. The computer is becoming a household appliance. The CD-ROM is to a computer what the telephone is to the house. The CD-ROM has enabled multimedia to grow. Multimedia enables you to combine the impact of television with the power of personal computing to create applications that are efficient, direct, personal, and interactive.

It's efficient because information can be replaced with information that you can see and hear, such as a video clip. It's direct because you can deliver information using the best medium, such as a language teaching application that plays a native speaker's voice to demonstrate pronunciation. It's personal because you can design applications with your own combination of elements. It's interactive because you can allow users the ability to control the flow of information. Multimedia brings sound and motion to applications.

Multimedia: Making It Work is an easy-to-read and extremely functional book. Vaughan keeps information on a level where all interested in multimedia or multimedia development can find useful information about software, hardware, and design techniques.

The Power of Multimedia

- Efficient: information that you can see and hear
- Direct: deliver using best medium
- Personal: design applications with own combination of elements
- Interactive: users control flow of information

Who should read *Multimedia Making It Work?*

- People who make multimedia
- People who want to make multimedia
- People who like challenges
- People unafraid of a learning curve
- People unafraid of intensely creative work
- People at all levels

Who Should Read Multimedia: Making It Work?

This book was written for people who make or want to make multimedia. Vaughan tries to entice those who are willing to take up new challenges but are not afraid of the learning curve or intensely creative work. Vaughan has written a useful book for all levels.

What is Multimedia?

- Woven combinations of:
  - text
  - graphic art
  - sound
  - animation
  - video elements
- Merging of
  - video
  - audio
  - graphics
  - text

Section 1: Introduction

Vaughan has included, in this introductory section, multimedia definitions and descriptions, making multimedia, and basic skills in training for multimedia production.

Vaughan defines multimedia as woven combinations of text, graphic art, sound, animation, and video elements. Sandler (1994) defines multimedia as the merging of video, audio, graphics and text in a multi-level, computer-based production that can be explained interactively. Both of these authors agree on the components of a multimedia presentation.

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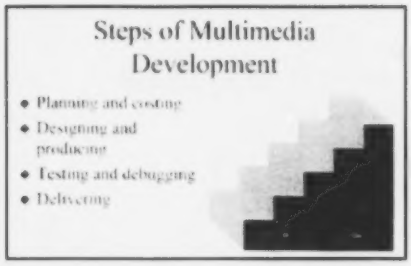
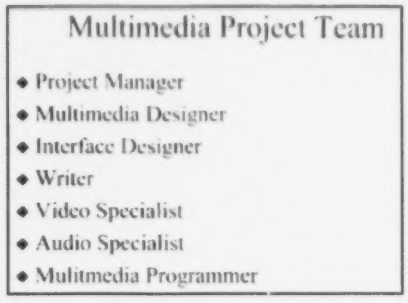


Vaughan and Sandler (1994) also agree on the stages/steps of development of a multimedia project. These stages/steps include planning and costing, designing and producing the presentation, testing and debugging, and finally delivering. The needs to develop multimedia presentations include hardware, software, creativity, and organization.

Multimedia teams require people with many skills. Vaughan and Fisher (1994) agree that many tasks may be

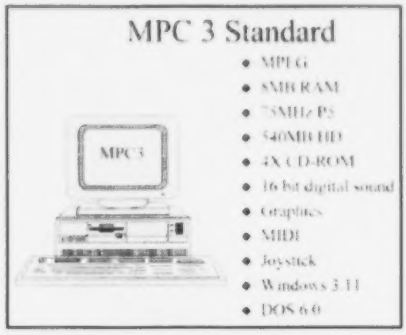


performed by the same person. However, Vaughan's team is composed of a project manager, multimedia designer, interface designer, writer, video specialist, audio specialist, and multimedia programmer. Fisher's team includes an art director, project manager, writer, subject matter expert, photographer and cinematographer, video editor, audio editor, copy editor, system administrator, and programmer. While these two teams differ somewhat in titles, the two authors agree on the job functions that need to be accomplished. Vaughan does indicate that the scope and content of the project may include some of these other functions.

Section 2: Multimedia Hardware

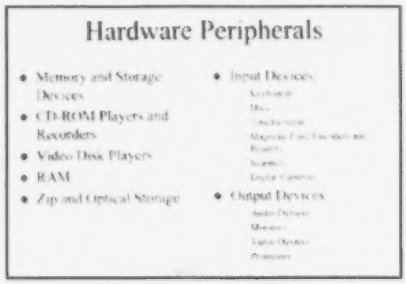
In this section Vaughan examines multimedia hardware. The section includes a comprehensive look at hardware and peripherals used to develop multimedia projects on both Macintosh and Windows platforms.

Vaughan is supported by Keyes (1994) in the specifications of a minimum MPC Level 2 PC platform. This standard includes a 25MHz 486, 8 MB RAM, floppy, 160MB or larger hard drive, CD-ROM 2X, microphone, and



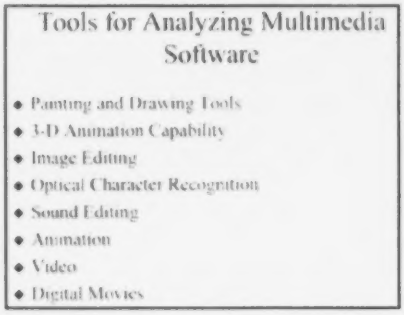
VGA monitor. Vaughan includes the next generation MPC 3 standard of 1995 that includes MPEG, 8MB RAM, 75 MHz P5, 540 MB hard drive, 4X CD-ROM, 16 bit digital sound, graphics, MIDI, joystick, W3.11, and DOS 6.0. Vaughan also includes information about the Power Macintosh.

The hardware peripherals included by Vaughan are supported by Keyes (1994). These include memory and storage devices, CD-ROM players and recorders, video disk players, RAM, Zip and optical storage. Input devices include keyboards, mice, touchscreens, magnetic card encoders and readers, scanners, and digital cameras. Output hardware discussed includes audio devices, monitors, video devices, and projectors.



Section 3: Multimedia Software

In this section Vaughan describes the basic tools needed within multimedia software to create and edit on both Macintosh and Windows platforms. The overall features supported by Wolfgram (1994) include easy delivery, adequate system checks for disk space, easy installation, and royalty-free distribution of the final product. The two authors agree that graphics features should include palette control, bitmap conversions, frame-by-frame timing and editing, and an integrated content editor for easy manipulation of images.



The basic tools for analyzing a piece of multimedia software include painting and drawing tools, 3-D animation capability, image editing, optical character recognition, sound editing, animation, video, and digital movies. Software with good capability will treat elements of these basic tools as objects and allows parts to be dynamically linked. Types of authoring tools include card- or page-based tools, icon-based tools, time-based tools, and object-oriented tools.

The key to good design and implementation (Wolfgram 1994) is to decide what your presentation is meant to ac-

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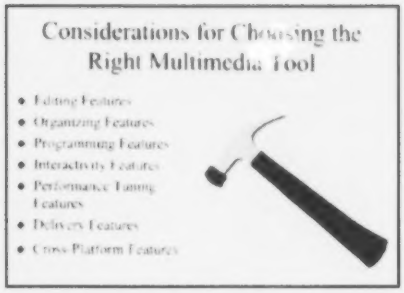
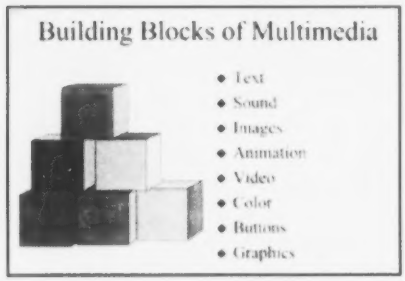


complish and then choose the appropriate tools to do the job. In choosing the right tool consider editing features, organizing features, programming features, interactivity features, performance-tuning features, playback features, delivery features, and cross-platform features.

Section 4: Multimedia Building Blocks

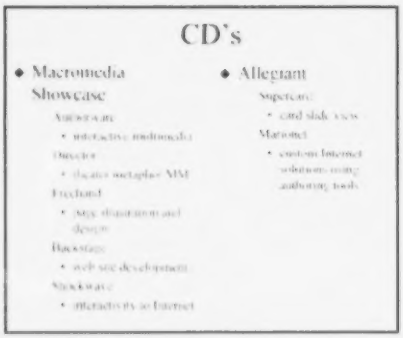
In this section Vaughan describes in depth the building blocks of multimedia. These building blocks include text, sound, images, animation, and video. In creating a multimedia application, Asymetrix (1994) supports Vaughan's idea of building blocks for text, color, graphics, buttons, video, and sound.



Vaughan does a very extensive analysis and description of these building blocks. This section begins the first instructional learning for multimedia newcomers and presents important multimedia guidelines and concerns.

MACROMEDIA SHOWCASE

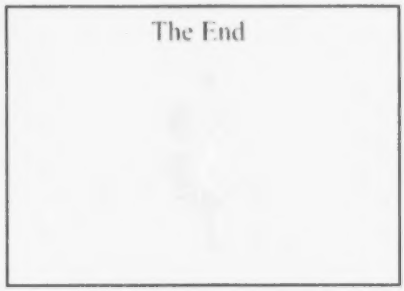
This CD gave a description of the software and product architecture. A full tour of the tools of Authorware, Director, Freehand, Backstage, and Shockwave were included. Authorware provides interactive multimedia and is the



industry standard. Director is a full-featured multimedia package that uses a theater metaphor. Freehand allows page illustration and design. Backstage is used for Web site development. Shockwave brings interactivity to the Internet using the other packages.

ALLEGIANT

This CD gave a description of the Supercard and Marionet software products. Supercard is a presentation package with a card slide view; video and audio can be added, and buttons can be used. Marionet builds custom Internet solutions using authoring tools. HN



REFERENCES

Asymetrix (1994). *Multimedia Toolbook User Manual.* Bellevue: Asymetrix Corp.

Fisher, S. (1994). *Multimedia Authoring.* Boston: AP Professional.

Keyes, J. (1994). *Multimedia Handbook.* New York: McGraw-Hill, Inc.

Sandler, C. (1994). *Creating Multimedia on Your PC.* New York: John Wiley & Sons, Inc.

Vaughan, T. (1996) *Multimedia Making It Work* (3rd ed.). Berkley: McGraw-Hill, Inc.

Wolfgram, D. (1994). *Creating Multimedia Presentations.* Indianapolis: Que Corp.

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HyperNexus

Volume 8 Number 2

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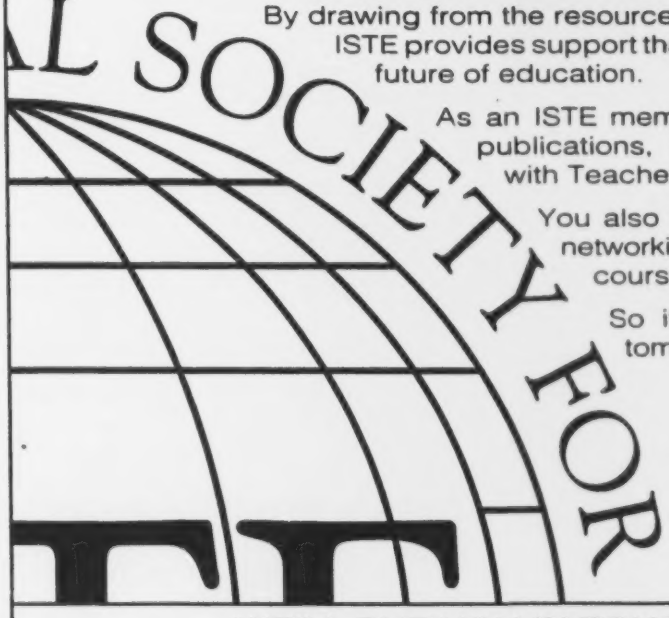

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JUNE 1998 VOLUME 8 NUMBER 3

JOURNAL OF HYPERMEDIA AND MULTIMEDIA STUDIES

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ADAPTING INSTRUCTION TO THE MEDIUM

TRUDY ABRAMSON

ADAPTIVE INSTRUCTION CIRCA 1998

THE WORD "ADAPTIVE" AS AN adjective describing instruction or assessment typically refers to a process that adapts to an individual learner. Recently, adaptive instruction has taken on a new meaning: Adapting presentation of instruction to available technology.

Today's Internet has three menu offerings: plain vanilla or all-text with hyperlinks; vanilla and chocolate, or text with still images and hyperlinks; and best of all, any three flavors, or text, still, and moving images, sound and hyperlinks. Given freedom of choice and the assurance that all orders will be filled equally fast, most people would opt for full hypermedia/multimedia. However, sometimes the best of all possible worlds is simply not available. Computers that access the Internet at a speed lower than 56 kilobytes per second (kbs) or that are equipped with last year's browsers, can do little more than present text at people-acceptable rates. The choice, then, is take what is available or do without. We advocate choosing to use Internet resources in the learning process.

Adapting learning to media is an instructional design (ID) issue whose solution is nowhere as cumbersome as it first appears to be. There are five steps to the ID process. First is analysis where a thorough assessment is conducted to determine the needs of the target audience. Second is design in which the subject matter expert provides the subject expertise to the designer who sculpts the lesson plan. Third is development where prototypes of the lesson take shape. Through these time-consuming, labor-intensive processes, tentative decisions are made regarding which media to use for product development. At the fourth step, implementation, the lesson is given a physical life of its own and becomes a product. The final ID step, evaluation, assesses the value of the product as an instructional vehicle.

INTERNET TECHNOLOGIES

Increasingly, education and training applications are being delivered across the Internet in order to reach as many learners as possible in as many different settings as possible. As defined above, the Internet is not a single technology so it then becomes necessary to ADAPT THE INSTRUCTION TO THE MEDIUM. In other words, the same content may be delivered using all text, text and graphics, and full multimedia. Will these option present equal learning opportunities? Of course, they do not. However, the alternatives are to bring everyone down to the lowest common denominator or to exclude those who do not have state-of-the-art online systems. Supporters of adaptive instruction say, in effect, "Here is the instruction. Avail yourself of the most sophisticated version possible."

How much additional development time is required to develop the three options? Refer back to the ID description above. Only implementation must be done in three versions to accommodate different browsers and modem speeds. Given the choice between text only or no access at all, almost everyone would choose text only. Similarly, given the choice between fast-access text and watching images come across one line at a time or watching images build at some unfathomable fashion, most people would choose text only.

Educators have long ago agreed that the involvement of the greater number of senses and the use of more sophisticated media enrich the delivery and accommodate the largest number of learning styles. Until the day when we all have the best possible technology, let us adapt instruction to available media.

IN THIS ISSUE

Volume 8 number 3 continues to reach out to our SIG audience at many different levels of education. Although we are gratified by the many phone calls and personal e-mail messages received complimenting the presentation and quality of *HyperNexus*, we would very much like to publish a Letters to the Editor page. This is YOUR journal and, at this time, the editorial board relies on brainstorming to determine what will please our readership and to publish articles accordingly.

Ron McFarland's instructional design model, part two, culminates in this issue. Because there was an issue gap in the presentation, the reference list is repeated in its entirety. Although the research presented is directed toward the creation of computer-based systems, the models described and procedures delineated obtain equally well for the development of Web-based instructional systems.

Paola Williams, HyperSIG Chair, responds to an issue that is close to the hearts and minds of all technology-using educators: What assurances are there that teaching and learning are being enhanced by teacher collaboration and technology integration?

We are pleased to present three image-based articles that illustrate what teachers are creating with authoring tools. One outcome of mastery of these systems is for teachers to create materials that enhance classroom learning resources. Another is for students to create products for authentic assessment of their work. Whatever your hypermedia/multimedia orientation, it is nice to know that these tools are available, easy to use, and allow the production of very nice software.

Thomas A. Drazdowski, a teacher educator who also directs the Teacher Technology Center at his institution, recommends multimedia resources for enhancing the process of the use of HyperStudio stacks in the learning process. HyperStudio is a multimedia authoring system created for use by elementary, middle, and secondary school students in the creation of authentic products that display content mastery.

In a parallel article, **Alex Pan** and **John Zbikowski** write about Asymetric ToolBook II and teacher education. This high-end multimedia authoring system is most useful for teachers who are concerned with developing computer-based materials for student use.

George Fornshell, contributing editor, provides insight into some of the work produced by distant students in an online masters program. The tool used for the presented here is PowerPoint '97. In earlier versions, PowerPoint was a presentation manager, but this version is an upgrade to a hypermedia development tool.

Trudy Abramson presents a "help sheet" of professional and non-profit educational association Web sites of interest to our readers. Because it is so easy to modify a site, the ones that come up on your screen may not match the illustrations provided.

The NECC '97 contest winners featured in this issue are **Barbara Mottola** and **Maryann Pionegro**. Collaboratively, they produced a full multimedia CD-ROM for nursing students in a community college program. **Helen St. Aubin**, who teaches biological science in a related program, reviewed the CD. She was so positively impressed that she produced a product review. Helen's review of Barbara and Maryann's work is published here to help readers get a better mindset about this excellent work.

As I review the contents of this issue, I cannot help noticing that there are no young child contributions to make this an all-inclusive issue. Once again, I urge our readership, send samples of student work. We would all like to see them.

HN

'I TEACH WHO I AM'

PAOLA WILLIAMS

HOW CAN WE BE ASSURED THAT teaching and learning will be enhanced by teacher collaboration and technology integration?

This is an essential question that I deal with often. I know that if technology is to be truly ubiquitous and seamless, it must be integrated into the existing curriculum. It must be as innocuous as a pencil or light switch. It must be an automatic choice. One must assume its presence in all learning environments. It must not be obvious.

As a student, engaged in learning, would I pick technology as a tool to accomplish a set of tasks, solve a problem, prepare a presentation, do research, or collaborate with others? Is it as easy as selecting a color pencil, or as thoughtless a task as lighting my work space? Unfortunately, for most students, it is not.

For most teachers, using technology to enhance an already existing lesson means taking time to reorganize, revamp, and rethink the lesson. Often, the technology drives the curricular experience when it should be a seamless extension of on-going learning. For both student and teacher, integrating technology does not appear to be seamless but purposeful. It takes more time, more energy, and often does not produce the expected results.

As a teacher for the past 20-some years, I have strived to integrate purposeful learning into my curriculum. Having worked with technology many of these years, the focus has always been to find the connection between the computer and the content.

Working more recently with other teachers over great distances, I have come to the conclusion that technology is integrated most seamlessly when done in a collaborative environment. Technology becomes secondary to the conversation that engages teachers as they share expertise, collaborate on a project, or find solutions for making learning happen.

I've also come to the conclusion that students are the best teachers when there is a mix of collaboration and technology. Teaching students in a virtual environment that depends on technology for our "virtual classroom," e-mail for receiving and sending papers, and our listserv for peer evaluation has allowed my students to get to know each other, get to know me as their teacher, and most important, become involved in the subject matter more intimately. Additionally, assessment for our class has been in the form of exhibition. We produce an electronic magazine as an outgrowth of our journalism writing.

As I have shared my experiences with you, the readership of *HyperNexus*, I'd like to invite you to join in this conversation. Send your stories about successes and failures to our editor. If we can extend our conversations, perhaps we can ensure that teaching and learning will be enhanced by the integration of new technologies, because we will have your best practices as testimony on how to do it.

Aloha,
Paola Williams HN

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FEATURE

The Instructional Systems Design Model in the Design of Technology-Based Adult Learning Systems

Part II

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KEYWORDS:
Analysis, Design, Development, Implementation, Evaluation

THE INSTRUCTIONAL SYSTEMS DESIGN MODEL

Almost all models of instructional development are based on the landmark Florida State University (FSU) model produced in 1976 (Center for Educational Technology, 1976). The FSU model is the most widely accepted process for designing instruction and uses a phased systems approach (Van Patten, 1996). Gagne, Briggs, and Wagner (1992) maintained that "instructional design should be conducted by a means of a system approach" (p. 5) and espoused the need for the integration of learning styles into the design of the final product. Several researchers have further documented methods based on the ISD model to assist the instructional technologist in the design of CAI software that addresses the various needs of learners (Andleigh & Thakrar, 1996; Garzotto, Mainetti, & Paolini, 1995; Isakowitz, Stohr, & Balasubramanian, 1995; Neilsen, 1995; Reynolds & Iwinski, 1996; Van Patten, 1996; Yang & Moore, 1996).

Reushle (1995) stated that the ISD provides a "framework" for a systematic design, development, and management of educational materials and programs. Alan Kay (1996), former CEO of Apple Computer, stated the need for a design approach for educational computing is to effectively address the complexity inherent in instruction. Yang and Moore (1996) stated that the design process following the ISD model generally involves the instructional designers in two activities: (1) creating a series of information screens and (2) organizing them into a certain order. Reynolds and Iwinski (1996) and Chapman (1995) outlined the Instructional Systems Design (ISD) method in terms of the following five phases:

- *Analysis.* A definition of the needs and constraints of the project. The analysis phase results in an Analysis Document.
- *Design.* A specification of (a) the learning activities (composed of assessment, evaluation, and learning transfer) and (b) the selection of the best media for the presentation. The design phase results in a (1) Design Document and (2) the Programmer-Ready Materials (PRM) document.
- *Development.* Development consists of (a) the construction of the software for the presentation and (b) the formative evaluation of the software (essentially user-testing). The development phase results in the constructed modules derived from the Programmer-Ready Materials (PRM) document.
- *Implementation.* The delivery, support, and maintenance of the constructed and tested presentation software. The implementation involves an implementation plan.
- *Evaluation.* A formative evaluation of the constructed software to measure the learning effectiveness of the constructed software. The evaluation phase is comprised of both a formative evaluation and summative evaluation. The evaluation phase results in a plan for both the formative evaluation and summative evaluation components.

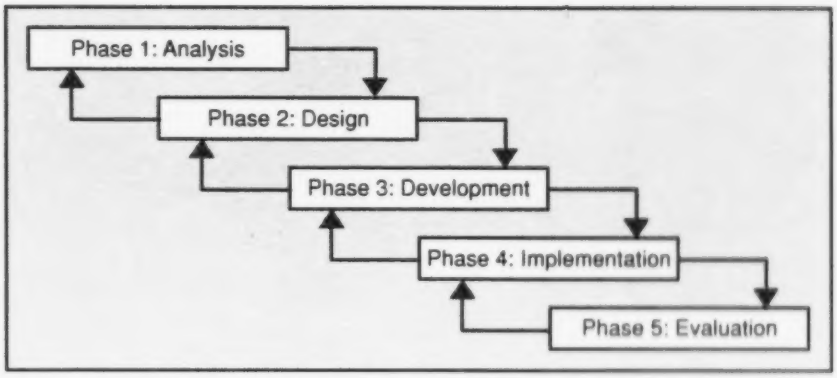

Figure 1: Five phases of the Instructional Systems Design (ISD) model

Each of the five phases of the ISD model and its respective components are explained in greater detail below.

PHASE I — ANALYSIS

The primary focus of the analysis phase is the problem identification and delineation of potential solutions (Yang & Moore, 1996). Andleigh and Thakrar (1996) referred to the analysis phase of the ISD model as the application of "knowledge and insight" to determine the opportunities and constraints for the project. The analysis phase includes a discussion of the target population, factors such as learners' previously acquired knowledge and skills, and present qualifications (Horton, 1994). Little (1996) stated that the analysis of educational multimedia requires the entire project team to think about questions prior to development such as the following: (1) What does the (subject-area) expert want to convey to the learners? (2) What will participants value form the course content? and (3) What is the desired user experience (regarding content)? Mauldin (1996) indicated that the identification of constraints can indicate how various restrictions can affect possible outcomes in the learning environment. Several researchers have noted that the ISD analysis phase, specifically, includes a definition of: (1) learner needs, (2) learning objectives, (3) a market/user analysis, (4) information source(s), (5) a description and decision of media used, (6) distribution channels for the implementation, and (7) a cost-benefit analysis (Blum, 1995; Horton, 1994; Garzotto, Mainetti, & Paolini, 1995; Isakowitz, Stohr, & Balasubramanian, 1995; Yang & Moore, 1996). The learner needs and learning objectives components of the analysis phase are described in greater detail in the below.

Learner Needs

The target audience and the target problems must be identified (Yang & Moore, 1996). Merrill (1987) stated that the delineation of learner needs is the most critical step in the process of analyzing and defining CAI. Blum (1995) listed several questions that should be asked about the needs of the learner. Theses questions can determine:

- An identification of the basic nature of the problem and the subsequent need for the training.
- An description of the required demonstration of skills and knowledge.
- A delineation of the targeted learner feelings or motivation for taking the training.
- The demographics of the targeted learners to provide more insight into the particular needs of the learners.

Learning Objectives

Learning objectives are another key part of the definition for an instructional system. The objectives for an instructional system include a specification of how learners are to sequence through the topical material and the criteria for how the learners are measured (Yang & Moore, 1996). Carefully written objectives will identify the sought-after behavior to trainers and learners (Mager, 1988). In a description of a system developed by Mager (1988), well-written and useful learning objective contain three elements; (a) behavior (performance), (b) condition(s) for learning, and (c) standard (proficiency or criterion by which learning is measured). Each of Mager's (1988) objectives for computer-based instructional development is described below:

- *Behavior.* The behavior, sometimes called performance, is what the learners must show to prove they have grasped the task. The objective must be written in action words that state the main intent of the purpose for the instruction. The behavior should match the job task, should be stated clearly, and should describe the simplest and most direct behavior possible. Clarity of the objective is accomplish this by observable and measurable action words. For example: choose, describe, write, identify, or solve are all classified as action words.
- *Condition.* Condition describes the environment the learner must function in during the test. The condition states what items or circumstances will apply, be provided, or withheld from the learner. The condition may include manuals or tools the trainee will have to work with.
- Criterion. The criterion is also called standard, or proficiency. It is the benchmark by which performance is evaluated. A proper criterion allows

the designer and learner to measure classroom success and must be stated clearly. Criterion is based on time limits, accuracy, or quality.

When developing objectives, care should be taken to ensure that all training objectives are mutually exclusive, clear, concise, and related to the learner needs (Kaiser, 1991). Golstein (1993) delineated the learning objectives as precisely controlled learning experiences to achieve these objectives, specified criteria for performance of the learner, and evaluative learner information. Goldstein (1993) listed other characteristics of instructional technology that include the following:

- A utilization of feedback to continually modify the instructional process. The Computer-Assisted Instructional tool must be designed to accommodate varied learner needs and divergent understanding of subject matter.
- A recognition of the complex interaction among the components of the Computer-Assisted Instructional tool. For instance, one particular medium, like video, might be effective in achieving a first set of learning objectives while another medium, like text, might be preferable for a second set of learning objectives.
- A framework provided by systematic analysis for planning and controlling the progress of the project including a high-level list of project deliverables.
- A systems-view of interacting instructional components depicted by a data-model comprised of major project components.
- A list of potential risks associated to varied social values.

PHASE 2 — DESIGN

Yang and Moore (1996) stated that the design of courseware can be addressed from two perspectives, content and presentation flow. Milheim (1996) discussed the design phase for the construction of educational CAI and the importance of a highly interactive learning environment. Blum (1995) stated that the interactivity of a computer-based educational environment is built when the content pieces are organized in a manner that is both "logical and desired" by the instructional developers and are "highly interactive." Costello, Curtis, Joyce, and Singer (1995) defined interactivity as a method where the learner is the "driver" and decides which direction to go in a series of screens and how quickly or slowly to get there. Three components of the design phase are; (1) job/task analysis (resulting in content), (2) the sequencing of instruction (presentation flow), and (3) programmer-ready materials (PRM). The product of the design phase is the Design Document (Appendix C - 2, "Design Document").

Job/Task Analysis

In job analysis, the complete set of duties that a person performs on the job is described. While instruction is needed, job analysis is often combined with task analysis. According to the Trainer's Dictionary, task analysis is, "a process of arriving at a step-by-step description of all the performance elements (tasks) that make up a job. Task analysis applies whether the steps of the task are mainly cognitive or psychomotor. Task analysis is done by questionnaires, observations of performance, and interviews." A term coined by Robert Gagne (Gagne, 1987), skills analysis is the components of the total analysis for an instructional system.

Andleigh and Thakrar (1996) described the specification of tasks in a hierarchical manner where each of the highest level tasks is decomposed into its constituent parts. A task may be of any size or degree of complexity. Tasks are divided into sub-tasks and the sub-tasks into elements where the design decomposition is stopped.

Sequencing of Instruction

One of the more important concerns in the application of learning theory is the sequencing of instruction (English & Reigeluth, 1996). Instruction should be organized in increasing order of complexity for optimal learning (English & Reigeluth, 1996). Yang and Moore (1996) referred to this as "chunking" the instructional components into manageable pieces. The result is that CAI developers can more readily manage instructional chunks (Yang & Moore, 1996). A number of researchers have suggested this complex-to-simple decomposition in learning environments (Blum, 1995; Reigeluth, 1992; Reynolds & Iwinski, 1996; Yang & Moore, 1996). When designers have constructed all the information chunks, associations between these fragments are linked into either a hierarchical or network representation (Yang & Moore, 1996). Blum (1995) referred to the assembling of the content chunks as the functional design aspect where a shift occurs "to a program-centered, rather than user-centered" perspective. Yang and Moore (1996) further suggested that the functional aspects of a CAI presentation be designed with: (1) a title screen, (2) an objectives screen, (3) a screen with an index (or menu), (4) content screens, and (5) a summary screen.

Hofstetter (1995) discussed the graphical representation of a hypertext presentation flow to be one of the following five types:

- *Linear list.* The linear list presentation type is a sequential list of links where the hypertext information can be displayed one item after another.

- *Menu.* The menu presentation type is a method to tie several linear lists to a selection screen.
- *Hierarchy.* The hierarchical presentation type is a construct where the design is a combination of multiple menus (sub-menus) and linear lists.
- *Network.* The network presentation type is the most complex metaphor where objects can be multiply linked to any other object (text or graphical component) in the presentation.
- *Hybrid.* The hybrid presentation type is the blending of lists, menus, hierarchies, and networks in a presentation.

Programmer Ready Materials

The Programmer Ready Materials (PRM) used for courseware development consists of information about what will happen at a given instant in the finished program and what will happen depending on what the learner does next (Reynolds & Iwinski, 1996). The PRM consists of detailed specifications that are given to the CAI programmer for coding of the presentation and contains the content, screen layouts, and storyboards (Reynolds & Iwinski, 1996). A storyboard is a designer's initial conception of what a screen should look like in a final presentation which may vary slightly from the delivered screens (Blum, 1995). Although there is no absolute standard for a storyboard, it is suggested that a custom storyboard be developed for the course material (Blum, 1995; Reynolds & Iwinski, 1996; Yang & Moore, 1996). Blum (1995) stated that following the construction of a storyboard, a navigation map, or flowchart, is constructed that graphically represents how the various pieces of information fit together. The flowchart should also be constructed to show all possible routes that a learner can take with the CAI (Blum, 1995). Yang and Moore (1996) suggested a presentation flow diagram (navigation map), sample screens, graphic art, and storyboards that encompass a programmer-centered document that will show the developer what is necessary for the construction of the CAI presentation.

PHASE 3 — DEVELOPMENT

The development phase is unique for any particular project and is partially dependent on the authoring tool used for the CAI (Blum, 1995; Mauldin, 1996). The activities and the people involved depend on the methods, programming environment, and media selected for the learning activities (Blum, 1995) and are diverse (Mauldin, 1996). Carlson, Hitzfelder, Hudson, and Redmon (1996) argued for an integrated team approach in developing the software. A team approach would facilitate information gathering from the expertise of teachers, instructional designers, cognitive psychologists, rhetoricians, and software engineers (Carlson et al., 1996). In addition, by having an integrated team, the transition from development to implementation is typically smoother (Carlson et al., 1996). The development of a CAI project is driven by the Programmer Ready Materials derived during the design process (Reynolds & Iwinski, 1996).

PHASE 4 — IMPLEMENTATION

The implementation phase is the regular delivery of the instruction to the intended audience (Reynolds & Iwinski, 1996). All instructional activities are part of this phase and include efforts towards delivery, support, and maintenance (Blum, 1995). Hofstetter (1995) discussed the implementing CAI, hypertext, and multimedia presentations in the Windows, MacOS, and Unix environments that included distribution on diskettes, CD-ROM, and the World Wide Web. The implementation of the study project in the Macintosh environment will be done on high-density diskette.

PHASE 5 — EVALUATION

An important part of any instruction, from both a problem solving and instructional design point of view, is the evaluation phase (Mauldin, 1996). While evaluation is usually considered at the end of an instructional development process, the evaluation phase actually encompasses the entire project, aimed from beginning to end at improving the quality of the instruction (Reynolds & Iwinski; Yang & Moore, 1996). Evaluation comes in two parts: formative and summative (Hoelscher, 1995). Formative evaluation is conducted using a small sample of the targeted learners during development, long before the general implementation of the CAI materials (Hoelscher, 1995). Summative evaluation measures the effectiveness of the materials in solving the instructional problem that you identified in the analysis phase (Hoelscher, 1995). Formative evaluation and summative evaluation are explained in greater detail below.

Formative Evaluation

During the developmental process, formative evaluation helps the developer of a CAI application increase the likelihood that the final product will achieve its stated goals (Flagg, 1990). Flagg (1990) describes the application and value of formative methods to improve final products:

> Formative evaluation helps the developer of a product during the early development stages to increase the likelihood that the product will achieve its goals in its final implementation. "Evaluation" in this definition means the systematic collection of information for the purpose of informing decisions to design and improve the product. The term "formative" indicates that information is collected during the formation of the product so that revisions might be made cost-effective. (pp. 9-10)

Flagg (1990) defined four phases of formative evaluation for educational technologies: (1) analysis formative evaluation occurs during the planning phase of program development, (2) design formative evaluation takes place during the design phase, (3) development evaluation occurs during the development phase, and (4) implementation formative evaluation occurs when the application is implemented. Hoelscher (1995) noted that the four phases of formative evaluation correspond directly to each of the phases of ISD development: analysis, design, development, and implementation. Each of the four formative evaluation phases are described in greater detail below:

- *Analysis formative evaluation* emphasizes the significance of developing goals appropriate to the learning setting. In general, sound instructional design dictates that the goals of instruction should be derived from learning needs. These needs can be identified from pretesting or from interviews or questionnaires of either students or teachers. Reeves (1989) also stresses the importance of assessing the worth of the project objectives in the context of the institutional needs.
- *Pre-production and production formative evaluation* focus on providing the most effective CAI presentation for the goals identified. Several continuing issues can be addressed, such as how to improve the instructional product, the delivery system, and the instructional system (Reeves, 1989). Instructional design reviews during the process of developing custom applications can consist of asking colleagues or students to evaluate preliminary flowcharts or storyboards (Hoelscher, 1995).
- *Implementation formative evaluation*, also termed "beta testing," involves having learners actually use the application and the equipment, and obtaining information on their effectiveness as an instructional tool.

Questionnaires, paper-based tests, and CAI-based tests are a few of the methods used to obtain information that can provide data for improving the CAI application's overall effectiveness (Hoelscher, 1995). By aligning the four formative phases of formative evaluation proposed by Flagg (1990) with the Instructional Systems Design (ISD) model, a modified representation of the ISD process can be described (AU, 1996). The modification for the ISD with its evaluative counterpart is shown in the figure below.

Summative Evaluation

Summative evaluation focuses on assessing the educational value of a CAI application and focuses on determining whether instructional goals were achieved, whether learners were satisfied with the instruction, and whether learning was efficient (Hoelscher, 1995). Summative evaluation is the collection and interpretation of data to determine the benefit of the training and is conducted during and after delivery of the CAI (Reynolds & Iwinski, 1996).

Kirpatrick's (1994) recommended a four-level model that was developed for summative evaluation and consists of the following levels:

- **Level 1:** Reaction—How well did the learners like the program? Reaction gathers the learners' opinions about the instruction. Reaction sheets are often used and typically involve the use of a Likert-type scale to measure learner's attitude toward the presentation.
- **Level 2:** Learning—What principles, facts, and techniques were learned? Learning is usually measured by a performance or verbal test. The test measures how well the instruction succeeded.
- **Level 3:** Behavior—What changes in behavior resulted from the program? Behavior usually takes the form of a survey sent to the learner's manager or instructor 60 to 90 days after the training has occurred. It helps to ensure that graduates continue to "measure up" in a changing environment. Often, this level is not used.
- **Level 4:** Results—What were the tangible results of the program in terms of reduced cost, improved quality, improved quantity? This level measures

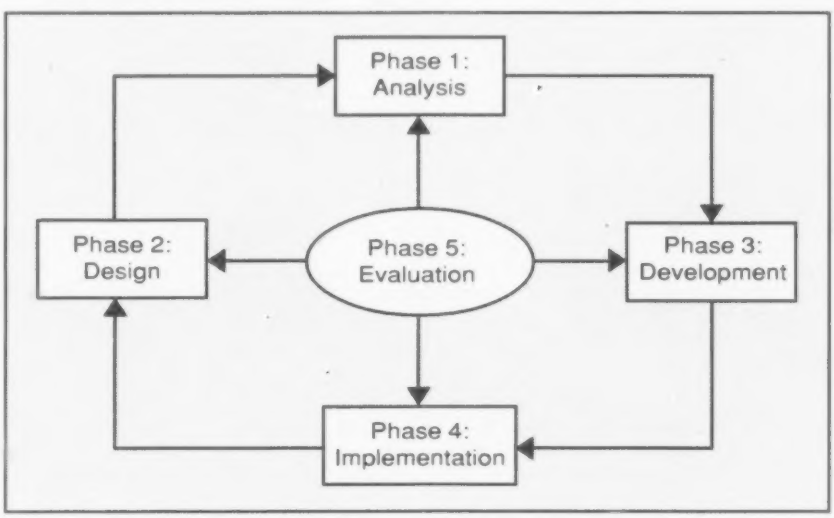

Figure 2: The ISD Model with its Formative Evaluation Counterparts

the increased benefit for "management's" or the "administration's" original intention for the training. Most technical and skills training can be related to a measure of value. Often this level is not used.

SUMMARY

This paper discussed the use of the Instructional Design Method for technology-based learning environments and presented the instructional designer with a method for effectively designing and implementing computer-mediated education. HN

REFERENCES

Abramson, G. W. (1992). Helping teachers create high-order, highly-motivating, hyper-media-based learning experiences. Part I: HyperCard. SIGTC Connections: *The Journal for Technology Coordinators. International Society for Technology in Education, 9*(1), 1-7.

Abramson, G. W. (1993). Digital Images in HyperMedia Productions. *Journal of Interactive Instruction Development, 5*(1), 3-8.

Air University (AU) (1996). Research and Development of Interactive Distance Learning Technology: Interactive Multimedia Distance Learning (IMDL) Project. *Air University Web Page* [On-line]. Available: http://www.brooks.af.mil/HSC/AL/HR/HRT/HRTT/imdl.htm.

Anderson, R. & Veljkov, M. (1990). *Creating interactive multimedia: A practical guide.* Glenview, IL: Scott, Foresman.

Andleigh, P. & Thakrar, K. (1996). *Multimedia Systems Design.* Upper Saddle River, NJ: Prentice Hall.

Ashley, C. (1992). University of Phoenix graduates first class of online MBAs. *Online Review, 16*(3), 161-163.

Berg, S., & Watt, J. (1991). Effects of educational setting on student responses to structured hyper-text. *Journal of Computer-Based Instruction, 18*(4), 118.

Blum, B. (1995). *Interactive media: Essentials for success.* Emeryville, CA: Ziff-Davis.

Borsook, T. (1991). Harnessing the Power of Interactivity for Instruction. *Proceedings of Selected Research Presentations at the Annual Convention of the Association for Educational Technology,* 123-137. (ERIC Document Reproduction Service No. ED 334 976)

Butler, J. & Clouse, W. (1996). Educational Technology and the Teaching of History: Promise, Practice, and Possibilities. *Journal of Educational Technology Systems, 24*(3), 211-223.

Carlson, P., Hitzfelder, E., Hudson, T., & Redmon, D. (1996, March). Classrooms as test-beds for educational software design. *Technological Horizons in Education (T.H.E.) Journal, 23*(8), 75-78.

Center for Educational Technology (1976). *Interservice Procedures for Instructional Systems Development* (Contract No: N61339-73-C-0150). Tallahassee, FL: Florida State University.

Chen, C., & Brown, S. (1994, April). *Results of the Computer Use Survey for School of Education Students.* Paper presented at the annual meeting of the American Education Association, New Orleans, LA.

Costello, J., Curtis, S., Joyce, E., & Singer, I. (1995, Fall). Interactive multimedia design: A visual approach. *Journal of Interactive Instruction Development, 8*(2), 3-7.

English, R. & Reigeluth, C. (1996). Formative research on sequencing instruction with the elaboration theory. *Educational Technology Research and Development, 44*(1), 23-41.

Falk, D. R. & Carlson, H. L. (1995). *Multimedia in Higher Education: A Practical Guide to New Tools for Interactive Teaching and Learning.* Medford, NJ: Learned Information, Inc.

Flagg, B. N. (1990). *Formative evaluation for educational technologies.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Fulton, K. (1993, Fall-Winter). Teaching matters: The role of technology in education. *Ed Tech Review,* 5-10.

Gagne, R., Briggs, L., & Wager, W. (1992). *Principles of instructional design* (3rd ed.). New York: Harcourt, Brace, and Jovanovich.

Goldstein, I. (1993). *Training in organizations.* Grove, CA: Brooks/Cole.

Garzotto, F., Mainetti, L., & Paolini, P. (1995). Hypermedia Design, Analysis, and Evaluation Issues. *Communications of the ACM, 38*(8), 74-85.

Heinich, R., Molenda, M., & Russell, J. (1994). *Instructional media and the new technologies of instruction* (4th ed.). New York: Macmillan.

Hoelscher, K. (1995). It's Too Late to Dig the Well When Your House is on Fire: Using Formative Evaluation to Increase the Educational Effectiveness of Technology Products. *The Electronic Classroom: A Handbook for education in the electronic environment.* Ed: Erwin Boschmann. Medford, NJ: Learned Information.

Hofstetter, F. (1995). *Multimedia Literacy.* New York: McGraw-Hill.

Horton, W. (1994). *Designing and Writing Online Documentation* (2nd ed.). New York: Wiley.

Howe, W. & Lisi, P. (1995, May/June). Beyond Diversity Awareness: Action Strategies for Adult Education. *Adult Learning,* 19-20, 31.

Isakowitz, T., Stohr, E., & Balasubramanian, P. (1995). RMM: A Methodology for Structured Hypermedia Design. *Communications of the ACM, 38*(8), 34-44.

Kaiser, J. (1991). *Development of CAI: An expert system in education.* East Carolina University. (ERIC Document Reproduction Service No. ED 304 483)

Kay, A. (1996). Revealing the elephant: The use and misuse of computers in education. *Educom Review, 31*(4), 22-28.

Kirkpatrick, D. (1994). *Evaluating Training Programs: The Four Levels.* New York: Berrett-Koeher.

Little, C. (1996, April). Mediating the message: Converting pre-existing materials involves more than a new coat of interactive paint. *Multimedia Producer, 2*(4), 23-24.

Mager, R. (1988). *Making Instruction Work.* Belmont, CA: Lake Publishing Co.

Marshall, C. & Shipman, F. (1995). Spatial Hypertext: Designing of Change. *Communications of the ACM, 38*(8), 88-97.

Mauldin, M. (1996). The development of computer-based multimedia: Is a rainforest the same place as a jungle? *Techtrends, 41*(3), 15-19.

McAdams, M. (1993, February). Intelligent Agent. *HotWired,* 29-33.

McKnight, C., Dillon, A., & Richardson, J. (1993). Why Psychology? In C. McKnight, A. Dillon, and J. Richardson (eds.), *Hypertext: A psychological perspective.* New York: Ellis Horwood.

Merrill, M., Schneider, E., & Fletcher, K. (1980). *TICCIT.* Englewood Cliffs, NJ: Educational Technology.

Merrill, P. (1987). Job and task analysis. In R. Gagne (Ed.), *Instructional technology: Foundations* (pp. 141-174). Hillsdale, NJ: Lawrence Erlbaum Associates.

Merrill, P. (1996, July). Illustrating the heart of interactive. *Multimedia Producer, 7*(2), 36-43, 66-67.

Milheim, W. D. (1996). Utilizing Case Studies for Teaching Effective Instructional Design Principles. *International Journal of Instructional Design Principles, 23*(1), 23.

Nielsen, J. (1995). *Multimedia and hypertext: The internet and beyond.* Boston: Academic Press Professional.

Reese, S. (1994, June/July). Music Technology: Tools for Extending and Sharing Minds. *American Music Teacher,* 12-13, 90.

Reeves, T. (1989). Research and evaluation models for the study of interactive video. *Journal of Computer-Based Instruction, 13,* 102-106.

Reushle, S. (1995). Design considerations and features in the development of hypermedia. *Distance Education, 16*(1), 141-156.

Reynolds, A. & Iwinski, T. (1996). *Multimedia Training: Developing Technology-Based Systems.* New York, NY: McGraw-Hill.

Simonson, M., & Thompson, A. (1994). *Educational computing foundations* (2nd ed.). New York: Macmillan.

Thuring, M., Hannemann, J., & Haake, J. (1995). Hypermedia and Cognition: Designing for Comprehension. *Communications of the ACM, 38*(8), 57-66.

Van Patten, J. (1996). What is instructional design? In K. Johnson and L. Foa (Eds.), *Instructional design: New alternatives for effective education and training.* Phoenix, AZ: Oryx Press.

Vaughn, M. & Thuente, K. (1995, May). Using technology in early learning classrooms. *Learning and leading with technology, 22*(8), 8.

Yang, C. & Moore, D. (1996). Designing hypermedia systems for instruction. *Journal of Educational Technology Systems, 24*(1), 3-30.

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Teaching HyperStudio Multimedia:

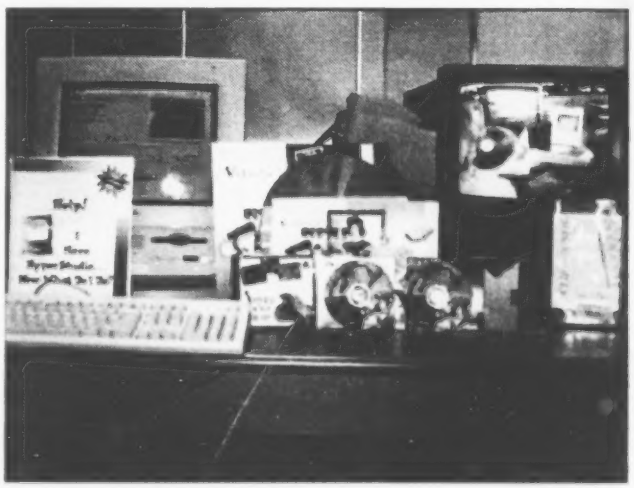
A Six-Pack of Resources

THOMAS A. DRAZDOWSKI

KEYWORDS:

Classroom-based Authors, Multimedia Resources

LIKE MANY TEACHER-EDUCATORS who work with preservice and inservice teachers in the area of multimedia design (Drazdowski, 1997), I have chosen to teach the authoring program HyperStudio, from Roger Wagner Publishing, because of its ease of use and wide popularity in many K–12 settings across the country. Therefore, I am always on the lookout for resources that may help me more effectively teach the class or workshop and give the students and teachers more creative options when designing their own multimedia stacks for classroom use. Following is a review of six resources I have found very helpful.



The book *Help! I Have HyperStudio… Now What Do I Do?* by McBride and Luntz (1996) is great for having students understand the importance of planning their multimedia stack. The authors emphasize planning the project on paper first in order to avoid mistakes and save time in the long run. Written by two practicing classroom teachers, the book is filled with wonderful worksheets and examples that will guide students and teachers in the planning, critiquing, and evaluating of multimedia projects. For example, there are blackline masters for a "Project Mind Map," a "Projects Goals Checklist", a "Project Blueprint" and "Storyboard" master, a "Master Card Layout," and a "Student to Student Critique" form. An appendix with "Stack Structures" and "Stack Ideas" is also included. I agree with the authors that this book will help students "avoid chaos on the road to creativity."

The CD-ROM Multimedia Music from Killer Tracks is a collection of 33 music clips of various lengths that can be incorporated into multimedia presentations. Categories include selections from "Hi-Tech Classical" to "Funk" and "Techno-Rock" (Above and Beyond and Bach to the Future are two of my personal favorites). This Mac and Windows compatible CD-ROM also includes 15 production elements and 15 sound effects to complement the sound files that are already incorporated into the HyperStudio program.

Speaking of additional sound effects, Clip-Sounds, a two diskette set from Monarch Software, is a an expensive must-have resource. The collection contains some 80 sounds of nature, transportation, animals, sports, and fantasy, ranging from "Aliens" to "Home Run!" to an evil sounding "Witch."

Teachers who are searching for QuickTime movies to use in stack development will find that Aims Multimedia offers a "Science" and a "Social Studies" multimedia clips CD-ROM that meet many needs. Licensed for non-commercial use only, each Mac/Windows compatible CD contains movies (165 on the "Science" and 205 on the "Social Studies" CD) as well as hundreds of still images (JPG) that cover a wide variety of topics. For a movie to demonstrate what happens to food when it is swallowed or for an inside tour of the large intestine, check out the "Science" CD. This CD also contains categories such as mammals, birds, weather, and insects. For movies ranging in topic from the "Dust Bowl" and the "Arms Race" to destinations from around the world such as the "Great Wall of China" or the "Black Sea," the "Social Studies" CD is a wonderful resource. This CD also contains movie and image sections on such topics as "People," "Government," and the "World."

Teachers searching for QuickTime movies to use in stack development will find that Aims Multimedia offers a "Science" and a "Social Studies" multimedia clips CD-ROM that meets many needs.

Another popular CD-ROM resource among students and teachers in my classes, especially for those in the sciences, is the Natural Science Library (Volume 1) from Applied Optical Media Corporation. This disk allows the user to browse through its many files and "Download" images to any drive or directory for later use. Several hundred high quality images portraying topics such as anatomy, biology, botany, chemistry and physics, nutrition and environmental science are included.

If laser disc players are available, (each of the 15 multimedia Power Macintosh computers in our Teacher Technology Center have a Pioneer laser disc player attached), a wonderful resource for multimedia construction is "The Visual Almanac" from Apple Computer.

This two-sided laser disc contains more than 7,000 images and two channels of sound that are organized into 12 collections. The collections include topics such as "Animals and Plants," "Everyday Physics," "The Solar System," "American History," "Around the World," and the "History of Daily Life." This resource will allow users to take advantage of HyperStudio's ability to construct buttons that can control the laser disc player. Any still frame from the laser disc can also be imported as a background or as clip art, or video segments can be turned into QuickTime movies. Indeed, my students feel that this is probably the most versatile resource for creative multimedia projects that I offer them.

Though certainly not an exhaustive list, I think that the resources described above will provide a solid foundation for expanding the creative opportunities that a teacher can provide for students as they design their own multimedia. Enjoy, and please share with *HyperNexus* some of the other resources that you have found valuable in your teaching of multimedia.

REFERENCES

Drazdowski, T. A. (1997). Multimedia in Teacher Education: A Small College Approach. In T. Muldner & T. C. Reeves (Eds.) *Educational Multimedia and Hypermedia 1997* (pp. 1119-1120). Charlottesville, VA: Association for the Advancement of Computing in Education.

McBride, K. H. & Luntz, E. D. (1996). *Help! I Have HyperStudio . . . Now What Do I Do?* Glendora, CA: McB Media.

Product Information

The book *Help! I Have HyperStudio . . . Now What Do I Do?* is available through the ISTE Catalog, 480 Charnelton Street, Eugene, OR 97401, (800-336-5191), http://isteonline.uoregon.edu: Clip-Sounds is distributed by Monarch Software, P.O. Box 147, Husum, WA 98623, (800-647-7997); Killer Tracks and the Science and Social Studies Multimedia Clips CDs can be purchased through the HyperStudio Network, Box 103, Blawenburg, NJ 08504, (609)466-3196, http://www.hsnetwork.com; the Natural Science Library (Volume 1) CD-ROM is from Applied Optical Media Corporation, 1450 Boot Road, West Chester, PA 19380, (610-429-3701); and the Visual Almanac laser disc can be found at Educational Resources, P.O. Box 1900. Elgin, IL 60121, (800-624-2926), www.edresources.com. HN

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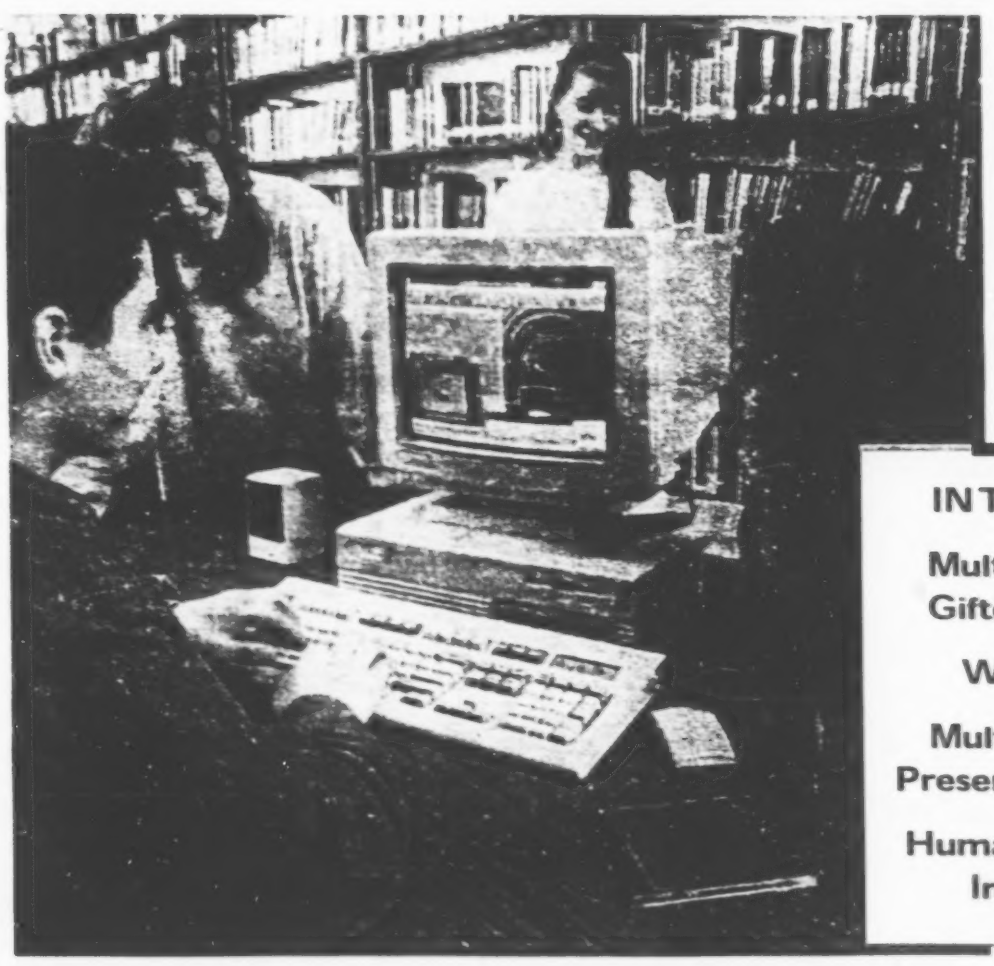
HyperNexus

AUGUST 1998 VOLUME 8 NUMBER 4

JOURNAL OF HYPERMEDIA AND MULTIMEDIA STUDIES



IN THIS ISSUE

Multimedia and Gifted Students

WebQuests

Multimedia and Preservice Teachers

Human-Computer Interaction

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A SPECIAL INTEREST GROUP PUBLICATION OF THE INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION

Creating Multimedia for the Classroom

ALEX C. PAN
and
JOHN M. ZBIKOWSKI

KEYWORDS:
Teacher Workshops, Interface Metaphors, Levels of Effectiveness

THE NEWEST GENERATION OF multimedia authoring programs has made it possible to bring the benefits of hyper-media to the classroom in applications tailored to highly specific, local curricular goals. No prior experience with programming or periphery is needed. From the most basic to the most powerful programs, user-friendly interfaces make authoring possible not just for teachers but for students as well, opening up a wealth of possibilities for engaged, interactive learning, and giving teachers greater control over materials used in their classes.

Making the most of the potential to create multimedia for the classroom with authoring programs requires careful attention to how teachers learn. Acknowledging the importance of conceptual understanding and the need for flexible control of software can make a difference in how well teachers will acquire authoring skills. Providing guidelines for effective design and integration of multimedia with curricular goals can help to maximize learners' intellectual growth.

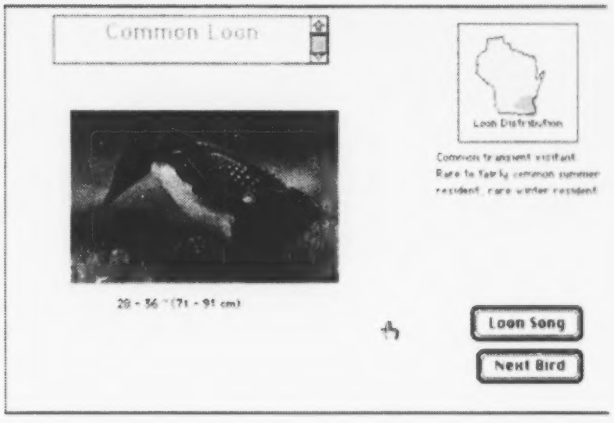
Making the most of the potential to create multimedia for the classroom with authoring programs requires careful attention to how teachers learn.

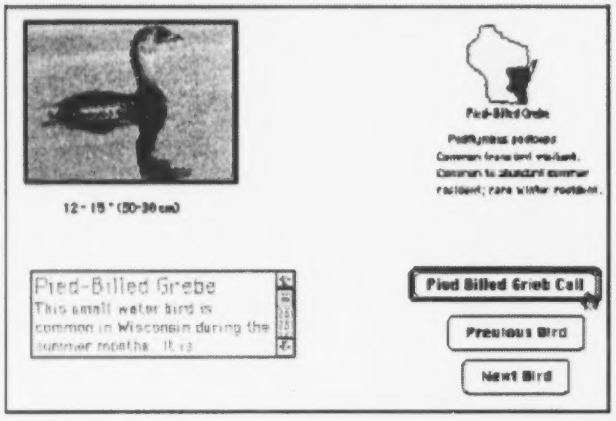
Teachers' authoring needs

We conducted a '97 NECC workshop on one of the most powerful multimedia authoring packages, Toolbook II (Asymetrix 1997). At that time, we had an opportunity to gain insight about how teachers acquire authoring skill. Toolbook II was an enlightening example not only because it contains some of the most sophisticated features of interactivity, Web publishing, and course management currently available in multimedia authoring packages, but also its interface was among the most challenging to learn. Workshop participants were predominantly K–12 classroom teachers and school technology coordinators who had extensive prior computing experience, though few had much knowledge of authoring programs. We acknowledged a concern expressed by several of the workshop participants that the program they were learning was currently too costly for their schools to purchase, or to purchase in sufficient quantities for their needs.

One common interest that emerged in the workshop reflected a trend in multimedia generally: teachers' desire to have connectivity with the Internet. This included creating hot links within applications to interesting URLs, as well as taking advantage of the program's ability to publish applications on the Web through a limited but effective HTML filter. When multimedia authoring becomes hypermedia authoring on the World Wide Web, the potential of applications for fostering learning increases exponentially.

Also, even though the group was divided between PC users and those more comfortable with a Mac, their level of comfort with the multimedia applications they created was independent of their preference in operating systems. This highlighted yet another trend in multimedia development as the Web becomes a universal forum for communication and publishing, namely the





tendency of applications to be platform-independent. This trend means that regardless of which operating system a teacher uses to create an application, the teacher's work will be accessible by more users regardless of the system they are using.

As is common in technology workshops for teachers, it quickly became obvious that the teachers were at different stages in their development despite their common interests. Although we had intended to focus on using the program's drag-and-drop interface, several participants, amazed by the power of the program to incorporate animation, audio, video, and textual input, wanted even greater control over the program than the interface provided. By watching more advanced users in the workshop, they learned how to cut and paste scripts to produce the particular effects they sought.

Suggestions for authoring beginners

Our brief experience working with teachers as they explored this powerful authoring program led us to some insights about how to introduce teachers to the potential of multimedia authoring. We hope to apply these insights in our teaching. We reproduce them here for everyone to share:

- *Emphasize conceptual understanding.* Although it can be interesting and enjoyable to explore an authoring program willy-nilly, going randomly from feature to feature, such an approach can also be frustrating and inefficient. A better approach is to make sure the workshop participants are familiar with the underlying metaphors that provide coherence for the interface—"pages" or "cards" to refer to parts of applications, and "books" or "stacks" to refer to entire applications, for example. Awareness of other concepts unique to particular authoring programs, such as "foreground" and "background," "reader level" or "browsing mode," or even "drag and drop" itself, can help the program's commands and techniques make much more sense.
- *Look at good samples.* In addition to any sample applications or tutorials provided by the software publisher, be prepared with several sample applications that illustrate specific program features being learned or specific uses of an application that are relevant to the teachers' needs. A stock sample earnings report might be fine to use with business educators, but teachers of biology or literature would probably benefit from something closer to their subject.
- *Include design issues.* No matter how powerful the authoring program, it cannot make judgments about content. Teachers need to know at least how to foreground the most important concepts in their applications with graphical elements such as color, typeface, and animation. Also, it is helpful to weigh the impact of large, high-resolution graphics on the end user. Huge images can distract as well as enhance understanding of a target concept. Moreover, larger images slow down the user's progress through an application, an issue that is increasingly important as more applications are published on the Web, with its often-slow downloading times. Conversely, a video that is small enough to include efficiently in an application might not be adequate to convey the desired content. As multimedia and hypermedia become ever more prevalent in commerce and art, it is no longer safe to assume that an application will have some impact merely because it includes color, sound, or animation. These elements need to be employed with just as much attention to audience effects as is needed in speech or writing.
- *Teach how to use online help.* Authoring programs have so many facets that teachers will continue

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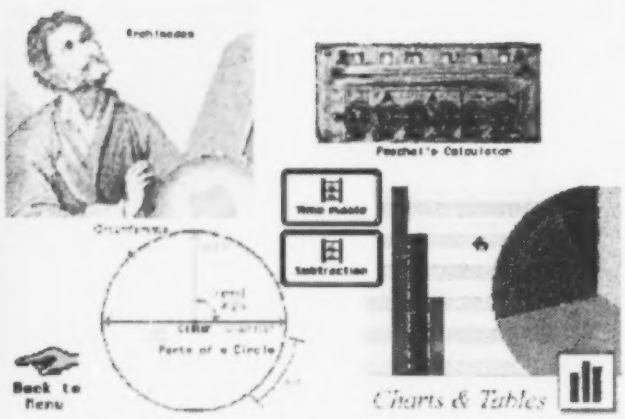

learning how to use them after the workshop is over. To insure that teachers are in a good position to continue learning independently, some practice using online help should be included in the workshop itself. Participants can learn how to compose queries or to follow links to the information they need to become proficient at all aspects of a program, including writing scripts if they so desire.

- *Involve students as well as teachers.* Teachers can learn multimedia programs with an eye to sharing their knowledge with students. As many teachers have already learned by having their students develop web pages, composing in hypertext presents unique opportunities for thinking about connections between different information and how to evaluate knowledge. When students use authoring programs to express their thoughts in multimedia and to publish online, they get to stretch their attention span and to see information in a new light. For purely practical reasons as well as to foster cognitive development, it can be helpful for students themselves to design course materials. Hypertext guides to unit concepts or course readings produced by students are beneficial to the authors as well as to the creators, and can be produced in much greater quantity than a teacher could possibly achieve alone. With the more powerful authoring programs, applications can be added to throughout the school year, and can even extend across school years, or, with Web connectivity, across school sites.

Judging the effectiveness of results

Teachers and users will know soon enough whether a multimedia application is achieving its intended curricular result. To prepare teachers to predict the effectiveness of their applications early in the development process, introducing the following criteria while learning to use authoring software can be helpful. At the first level, a teacher is successful if the application works regardless of the platform. At the next level, not only can the application be used, but someone will *want* to use it. Finally, at the highest level, the learner wants to use the application and may grow with it. Having these three criteria in mind throughout development can help to maintain a proper focus.

CONCLUSION

Teachers are ready to take advantage of the potential for tailor-made multimedia applications in their classes by using the latest multimedia authoring programs. Intuitive interfaces make it easier than ever to create interactive multimedia experiences for learners, to make them accessible over great distances, and to give learners a role in application development. Acknowledging the diverse levels of experience present in most groups of teachers as well as their interest in maximum control of their work is a good starting point for introducing teachers to the benefits of multimedia authoring. Keeping a few basic suggestions in mind when helping teachers learn to use authoring programs can help everyone involved reap the greatest possible benefit from ever more sophisticated multimedia applications. HN

REFERENCE

Asymetrix Inc. (1997). Toolbook II [Computer software] Bellevue, WA: Author.

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Dr. John M. Zbikowski, Associate Professor of Education, College of Education, University of Wisconsin-Whitewater. zbikowsj@uwwvax.uww.edu.

PowerPoint '97 as Authoring Tool

GEORGE K. FORNSHELL

KEYWORDS:
Interactive Software, Hypermedia Development

ONE OF THE ON-GOING PROBLEMS of teaching a course in authoring systems in a distance learning program is finding an environment for product implementation. PowerPoint '97, a component of Microsoft Office '97, is touted as a full multimedia authoring program. While the product is not free of imperfections, it certainly is a distance educator's dream come true.

During the winter 1998 term, 21 distant graduate students worked online in teams and as individuals to produce prototype interactive software products using PowerPoint '97. The assignments were very specific as to the contents of the screens and the requirement for user participation. Very significant to our readers is the fact that the authoring tool itself has a very short learning curve. When we compare this tool to earlier inexpensive hypermedia development ones such as HyperCard and LinkWay, it becomes clear what wonderful software advances have been made in this decade. Featured below are representative screens from some of the team products and assignments produced for the course. HN

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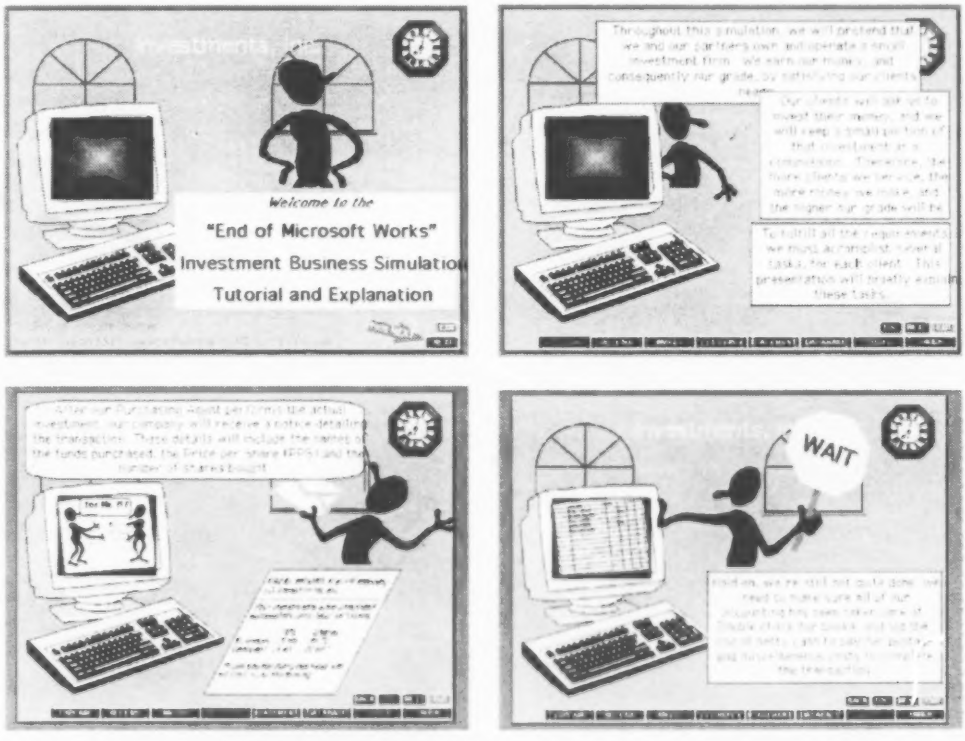
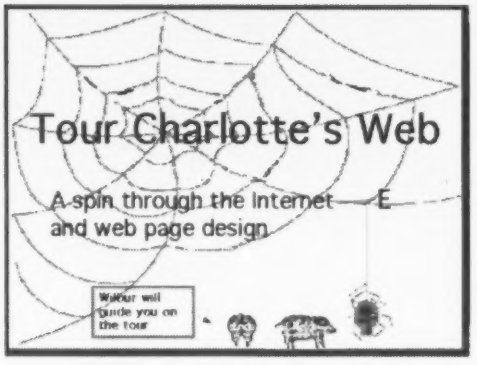
END OF MICROSOFT WORKS

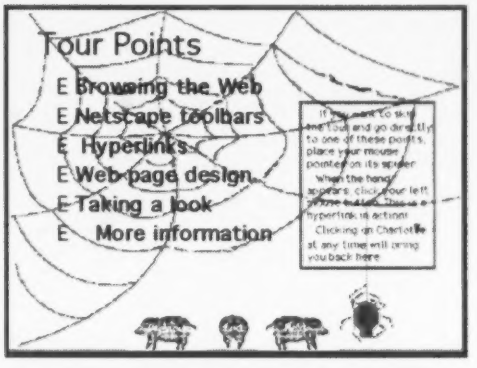
"End of Microsoft Works" Investment Business Simulation Tutorial and Explanation is the independent creation of Timothy Winner. The animated figure serves as a guide and presenter throughout the program. Data moves effectively on and off the screen. For a copy of the program, write to the author at winnert@scis.nova.edu.

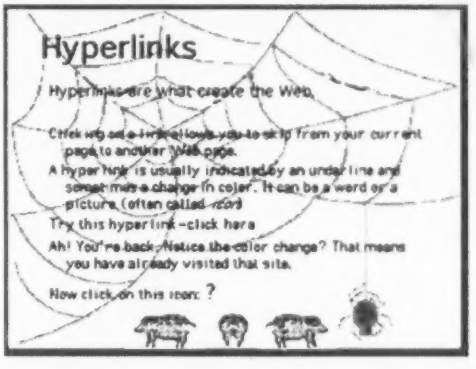


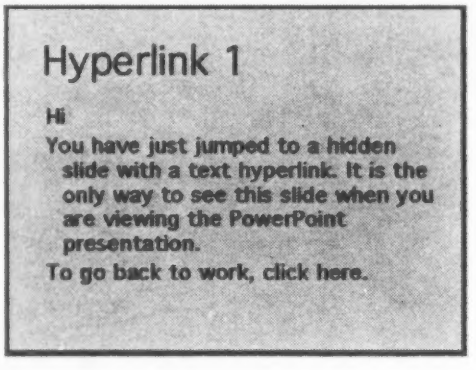
TOUR CHARLOTTE'S WEB

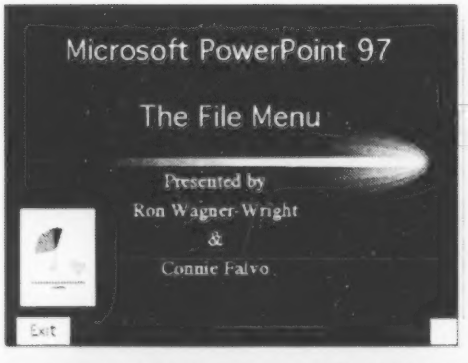
Tour Charlotte's Web is the final-exam product of Kathleen Camarena. It uses the metaphor of the popular children's book and combines it with the Internet metaphor of the World Wide Web (WWW). It is charming, attractive, and skillfully implemented. Once again, the "action" can be seen only on a computer. For a copy, write to Kathy at camarena@scis.nova.edu .

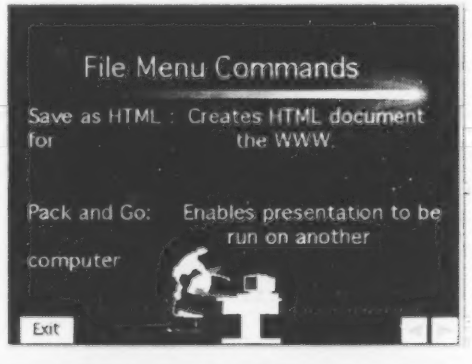


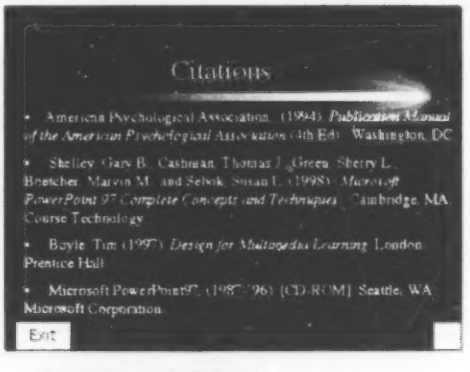



Hyperlinks
Hyperlinks are what create the Web.
A hyperlink is usually indicated by an underline and sometimes a change in color. It can be a word or a picture. (often called -icon)
Try this hyperlink – click here
Ah! You're back. Notice the color change? That means you have already visited that site.
Now click on this icon: ?


Hyperlink 1
Hi
You have just jumped to a hidden slide with a text hyperlink. It is the only way to see this slide when you are viewing the PowerPoint presentation.
To go back to work, click here.




File Menu Commands
Save as HTML : Creates HTML document for the WWW.
Pack and Go: Enables presentation to be run on another computer
Exit



MICROSOFT POWERPOINT '97

Microsoft PowerPoint '97: The File Menu is a team production created as a first hypermedia product by Ron Wagner-Wright and Connie Falvo. It contains dynamic phrases and resources that are hyperlinked to the WWW. Write to Ron at wagnerr@scis.nova.edu or Connie at falvoc@scis.nova.edu for a copy of their product.

Ten Web Sites for Educators

TRUDY ABRAMSON

KEYWORDS:
Professional Societies, Virtual Associations, Online Resources

This "help sheet" is the first of several planned to give the reader a hand in sorting through the myriad offering on the World Wide Web. The addresses on this list are of authentic educational associations and a few virtual ones involved totally or partially with education. Because each reader has unique research and professional needs, there are no "best" sites, simply different ones. The organizations represented here are by no means an all-inclusive list. Readers are encouraged to add to this list by writing to the editor. The statements that follow the association names are author remarks provided for information purposes. The list is arranged in alphabetical order.

http://www.aace.org ▶
Association for Advancement of Computing in Education. AACE is the parent organization of the Society for Information Technology and Teacher Education (SITE). This organization is made up largely of teacher educators and other personnel in schools of education around the world.

◀ http://www.aahe.org
American Association for Higher Education. Steve Gilbert maintains and edits a listserv that I highly recommend. Follow the directions above for joining. For example, I would write: Subscribe AAHESGIT Trudy Abramson.

For the novice, it will help to think of a Web site as a card catalog or a book index. Each Web site provides links (usually phrases to be clicked) that will take the user to another site that might be an article, a picture, another listing of linkable options, or a dead end.

The dead ends make novices feel they did something wrong. That is not the case. Think of a dead end as a book listed in the catalog that has been removed from the shelves.

Another term worth understanding at this point is a listserv. Simply put, a listserv is a special interest discussion group managed by an Internet server. List owners (see Gilbert below) sometimes serve as moderators, but, more often than not, listservs are open equally to all participants. The major problem of membership is that many messages are added regularly to incoming e-mail. To join a listserv, send the e-mail message (with subject line left blank) to mailto: LISTPROC@LIST.CREN.NET with the single line "Subscribe LISTSERVNAME yourfirstname your-lastname". To remove your name from the receiver list, follow the same procedure using the word "Unsubscribe".

The images that accompany this article are the first screens of the sites. They were downloaded at the beginning of June 1998. It is possible that the image you bring up when you type the address or URL (Universal Resource Locator) will be different. One of the advantages of electronic pages is the ease with which they may be modified. To visit a site, type the address that begins http:// in the space provided at the top of the browser for the netsite. The URLs with a brief description of each follow.

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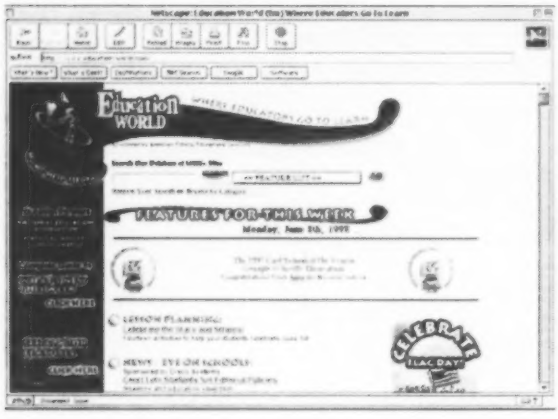
http://www.aect.org ▶

Association for Educational Communications and Technology. This is one of the premier and oldest educational technology organizations and a sponsor of NECC.



◀ http://www.education-world.com

Sponsored by American Fidelity Educational Services, Education World is a database of 50,000 education sites. Visit this site on a day you have a great deal of time to spare.

http://edweb.gsn.org ▶

This site, maintained by Andy Carvin, is a major resource for K–12 teachers of all subjects. In addition to providing a major online resource site, Andy offers an updated listing of e-mail discussion lists and electronic journals that you may subscribe to easily from this site.

◀ http://www.gsn.org

Global Schoolnet Foundation is a site for "linking kids around the world." Al Rogers is executive director of this non-profit company that provides a variety of free and low-cost Internet-based services to teachers and their pupils.

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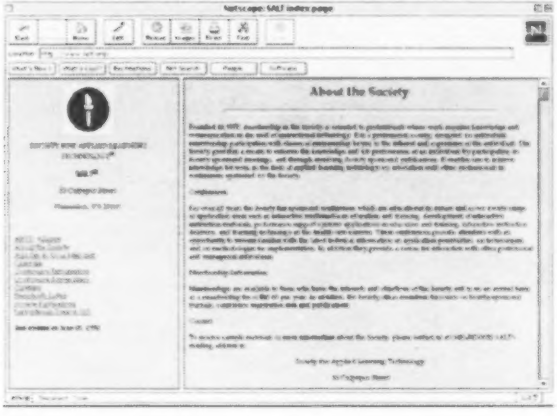
http://www.iste.org ▶

The International Society for Technology in Education is the parent organization of our SIG. Make this site a "must visit." Look for the *HyperNexus* page. Members of ISTE include K–12 teachers, university-based teacher educators, computer coordinators, and people from the public sector involved in technology-based learning.

◀ http://www.ncate.org

National Council for Accreditation of Teacher Education. Visit this site for technology standards and professional teaching standards. This site is of special interest for teacher educators.



http://www.salt.org ▶

Society for Applied Learning Technology. This organization is concerned with mostly-adult issues of computer-based learning and training. Its members include academics, corporate trainers, computer-based product developers, and members of the armed forces.

◀ http://www.usdla.org

The United States Distance Learning Association is a non-profit association whose purpose it is to promote the development and application of distance learning for education and training. Its constituents include K–12, higher education, continuing education, corporate, military, and government training.

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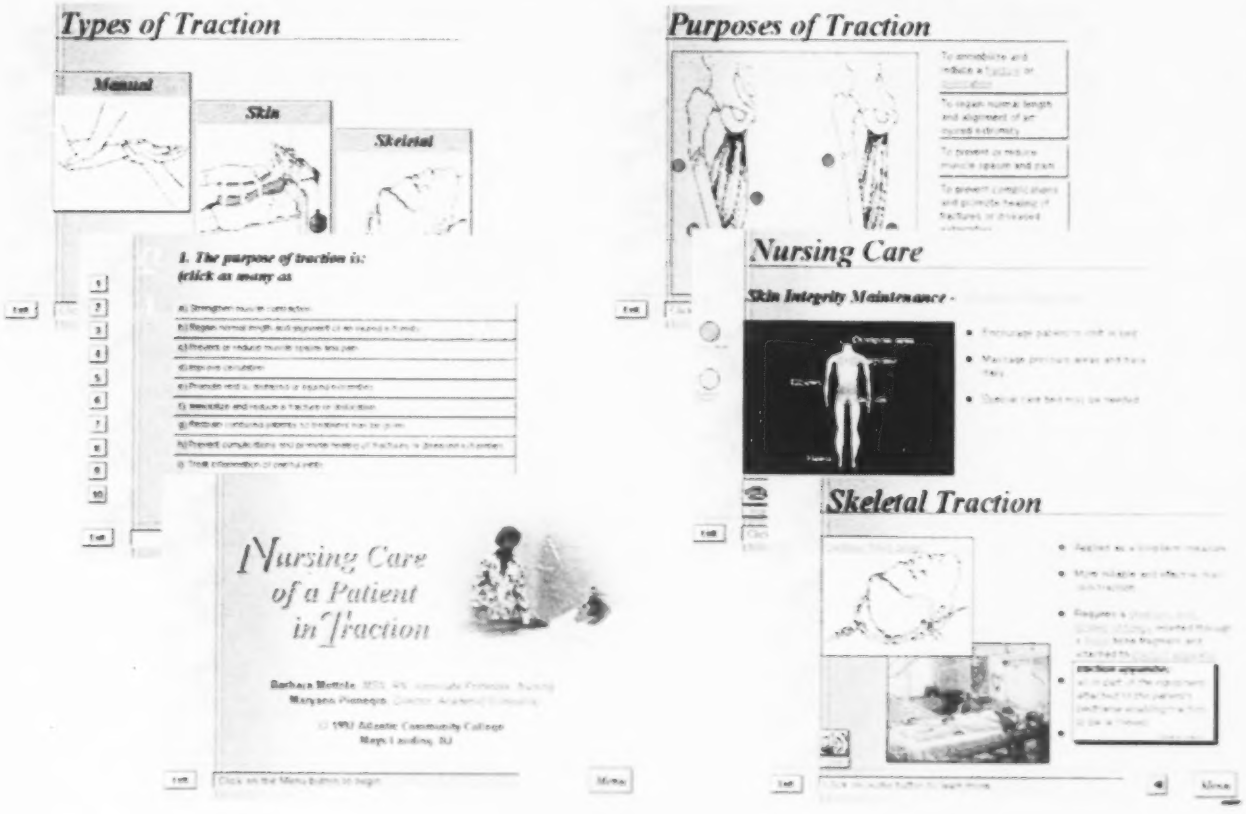
Nursing Care of a Patient in Traction

BARBARA MOTTOLA
&
MARYANN PIONEGRO

KEYWORDS:
Nursing Education,
Virtual Demonstrations,
Visual Enhancements

Editor's Note: Barbara Mottola, Associate Professor of Nursing, and Maryann Pionegro, Director of Academic Computing at Atlantic Community College in New Jersey worked as principals on a community college-based multimedia team and developed this software tutorial to help nursing students master care of a patient in traction. The judges of last year's software development contest agreed unanimously that this was the most professional entry and could compete with marketed software. The screens presented below were selected by the authors to exemplify their work. HN

Barbara Mottola
mottola@nsvm.atlantic.edu
Maryann Pionegro
pionegro@atlantic.edu



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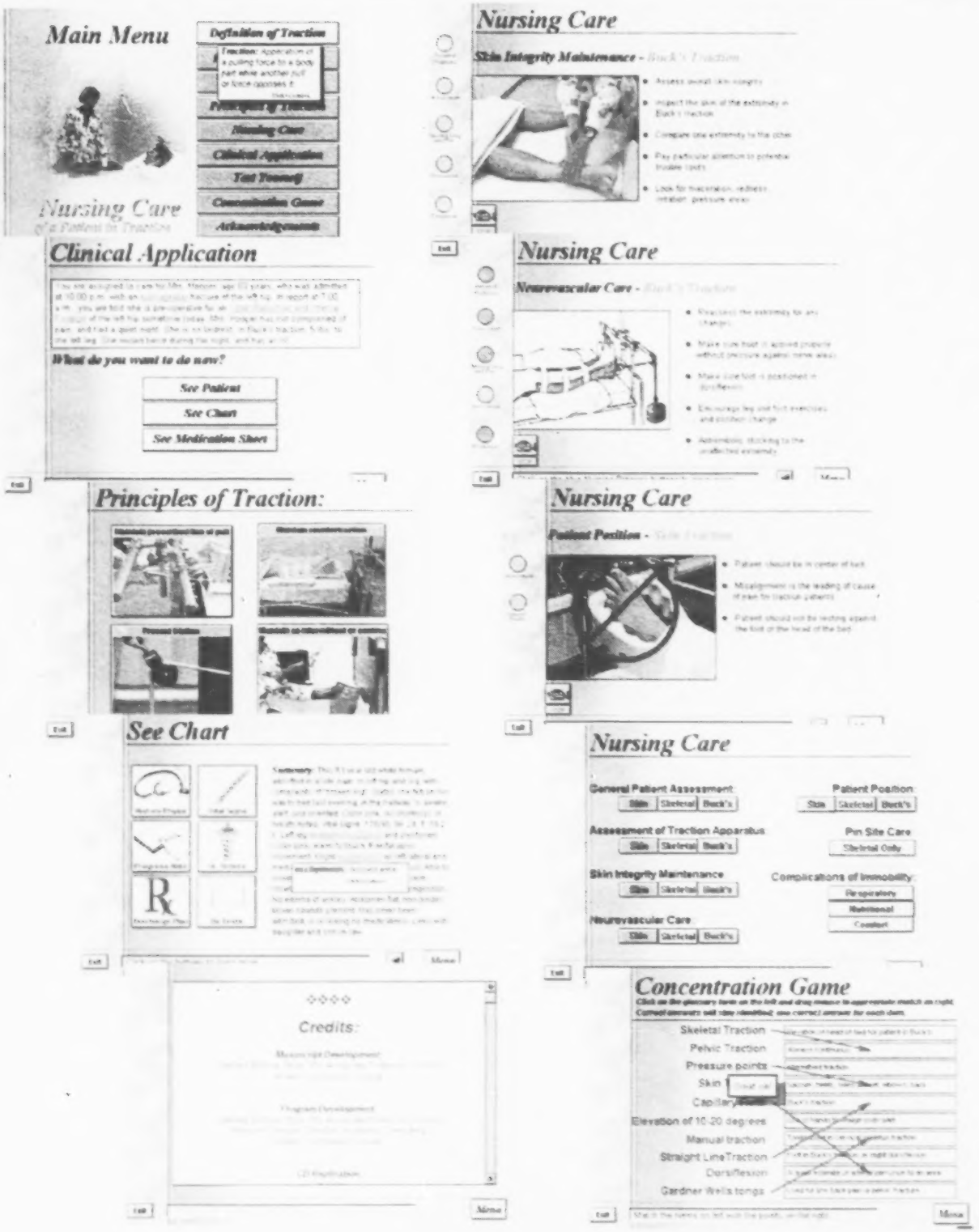

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Nursing Care of a Patient in Traction

HELEN ST. AUBIN

KEYWORDS:
Full Multimedia Learning Resource, Virtual Demonstrations

Year: 1997
Publisher: Atlantic Community College
Produced by: Barbara Mottola, MSN, RN, Associate Professor, Nursing, and Maryann Pionegro, Director, Academic Computing
Media: CD-ROM
Platform: Windows 95, Asymetrix Toolbook
Hardware: IBM (compatible), CD-ROM, desktop color - 24 true bit and pixels set for 800x600
Classification: Educational
Subject Area: Nursing care of the adult medical-surgical patient, program developed for use in an associate degree nursing program for students seeking to become RNs (registered nurses)
Age range: Post-secondary level

This is a Windows-based educational CD-ROM from Atlantic Community College. The primary purpose is for a general introduction to nursing care of the adult medical-surgical patient. The program was developed for use in an associate degree nursing program for students seeking to become registered nurses.

PROGRAM DESIGN

Nursing Care of a Patient in Traction starts with an introductory screen of a nursing picture, music, and a button to go to the Main Menu. The Main Menu has an excellent set-up of menu buttons for selection of nine topics. This screen is not cluttered and is easy to read. The nine topics are: Definition of Traction, Purposes of Traction, Types of Traction, Principles of Traction, Nursing Care, Clinical Applications, Test Yourself, Concentration Game, and Acknowledgments. The items through Clinical Applications are very well-implemented selections of multimedia options such as buttons to access definitions that are very explanatory in nature; clear anatomical diagrams with colored selection buttons for further links to information; audio explanations; and many video clips that also have audio.

Installation and Documentation

Installation is simplified and brief. However, the installer will need to understand Windows 95 and the use of a CD-ROM disk. Written loading instructions need further instructional clarification, depending on the ability of the installer. A brief instructor's manual would be beneficial. (Editor's note: The instructors were the developers. They know how to use their product.)

Instructional Points of Interest

The audio throughout the program is very good with clear diction and excellent definitions. The videos are good examples of "how to." The various topics are well-documented. Of special interest is the topic on Clinical Applications, which has very good examples of student reinforcement. Also providing student reinforcement are the topics Test Yourself, which is a reinforcement, multiple-choice test, and Concentration Game, which is an interesting matching game. Both of these topics have excellent directions. All the topics with their many links to additional information can be repeated for reinforced learning, and the interactivity of each topic is an enticement for the student to return to a number of sites to repeat and reinforce the learning process. Positive reinforcement is present throughout the topics with words of praise for correct actions taken by the student, or words of encouragement when an incorrect answer is given.

This program succeeds in enhancing a nursing program relative to the topic of nursing care of a patient in traction. HN

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HyperNexus

Volume 8 Number 3

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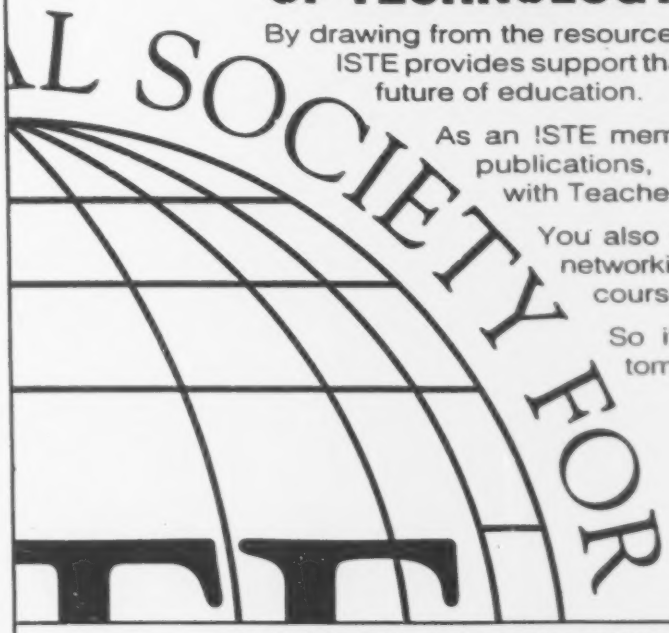

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HyperNexus

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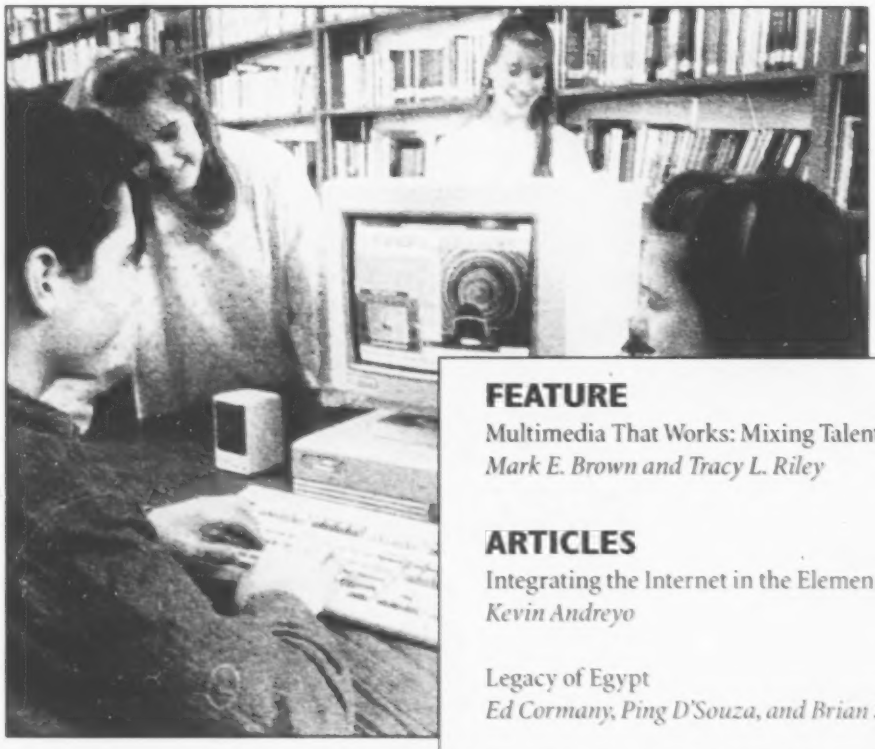

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YESTERDAY, TODAY, AND TOMORROW

TRUDY ABRAMSON

NECC '98

THE 19TH ANNUAL NATIONAL Educational Computing Conference (NECC '98) took place in San Diego, CA, on Monday, Tuesday, and Wednesday, June 22-24, 1998. Each year, the conference gets bigger and better. Kudos to Peggy Kelly, conference chair, and to Sara Armstrong and Anita Best, program co-chairs, for a job done well. Each person who attends a conference has a unique set of motives for being there. Mine are to renew old friendships, establish new ones, and to obtain first-hand knowledge of new concepts, skills, and technologies.

One of the reassuring aspects revealed through personal networking, attending sessions and visiting with multiple exhibitors at NECC '98 is that the great educational technology revolution is entering its maturity phase. No quantum changes were observable. Voice-input technology is getting smarter and Internet transmission is becoming faster. There is less discussion of computer phobia and more acceptance of technology in schools. The newness is wearing off. Computer use has become more natural, more comfortable, and more accepted as a feature of contemporary society.

According to David Thornburg, a keynote speaker at the conference, we must prepare students for their future, not for our past. Using this message as a springboard for investigation, we must then ask these questions:

- When does the future begin?
- What will the future bring?
- How will it differ from the present?
- How is "our past" different from the present?
- Which aspects of the past and the present are worth retaining?
- How do we write curriculum for an undefined future?

YESTERDAY

About 20 years ago, school technology included TRS-80s by Radio Shack, Apple IIs and IIEs, Commodore Pets, TI99-4s from Texas Instruments, and, shortly thereafter, IBM-PCs. (I have arbitrarily chosen the time that microcomputer storage moved from tape to floppy disk as the beginning of yesterday.) School boards and administrators were beginning to awaken to potentials of technology tools in the learning process. Colleges and universities were moving away from dumb terminals empowered by large mainframe computers and internal mini-computer systems to join the PC revolution.

At the time, in addition to teaching courses in business data processing, I conducted computer literacy classes for in-service teachers. In terms of general school-staff orientation, most of my commissions were restricted to training teachers in the use of drill-and-practice software as reinforcement and guided practice and in the willingness to use plug-and-go software. Some of the latter was truly remarkable all things considered. The classic, Oregon Trail from MECC, dates back to 1978 and draws rave reviews today. PC-based word processing was still quite primitive. Remember SuperScriptSet (spelling?) and the joy of moving up to PFS Write and WordStar? Many of our readers can recall the remarkable graphics, animation and even music that could be written with BASIC, Logo, and SuperPilot, early software development tools that inspired student creativity and pride in learning. Schools introduced writing programs with no printer access and textbook replacements where an entire class shared a single computer and then blamed the computer for failure. Research indicating successes and benefits of technology use almost universally addressed the affective domain. But that was yesterday.

TODAY

When did today begin? Well, it crept upon us slowly but surely. Computers revolutionized the workplace and schools barely noticed. (There are always exceptions to a rule. We do not debate it.) Computers moved into the home and schools began to take notice. The Internet brought the world to the desktop and the inevitable could no longer be denied. Computers have become ubiquitous. They allow us to read, write, listen, observe, search, select, create, calculate, simulate, communicate, organize, store and retrieve, work collaboratively, and more.

Increasingly, classroom technology includes productivity tools such as word processors, spreadsheets, databases, and Internet Service Providers. Teacher education programs have moved beyond a single technology course into technology diffusion across methods courses. The NECC '98 conference sessions rebounded with examples of classroom tool use enabling authentic, constructivist, learning experiences for children. The debate about the potential value of introducing technology to primary and secondary schooling is over.

TOMORROW

What will the future bring? The answer is largely up to us. Our collective job, each in his/her own bailiwick, is to use computer-based technology to best prepare students for their future. How do we enhance teaching and learning with hypermedia, multimedia, and the Web? How do we create authentic learning experiences and assess them fairly? How will our new tools help us overcome learning disabilities and physical disabilities? How do we measure the added value technology diffusion brings to the learning process? We invite all our readers to present solutions to the questions above and to pose additional questions and provide solutions for them as well.

IN THIS ISSUE

We are delighted to complete volume 8 with the presentation of articles from across the country and the globe. Because HyperSIG announced the winners of a second development contest, Multimedia Madness, at NECC '98, it behooves us to complete presentation of the NECC '97 winners in this issue. As presented in volume 8 issue 1, there were six winners. The work of three were presented in issues one, two, and three. A fourth, Tom Beutel, published an article about his work in an earlier volume. The two remaining winning entries are featured here.

Paola Williams, HyperSIG chair who hails from Hawaii, has a regularly featured column that was not received at press time. Stay tuned for volume 9, number 1.

Mark Brown and **Tracy Riley** present the results of a series of workshops designed for gifted nine- to 12-year-old students. Their work, from Massey University in New Zealand, provides exciting insights into ways multimedia may be used to enrich learning.

Kevin Andreyo, project manager of Educational Technology Services in Reading, PA, and *HyperNexus* contributing editor, responded to our plea for representation from elementary education. His article discusses the use of WebQuests, a model for using Internet resources in the curriculum, as developed by Bernie Dodge.

Adrian Geszler, computer education teacher at Woodbury Elementary School in Shaker Heights, OH, submitted a winning entry for students Ed Cormany, Ping DiSouza and Brian Sutorius. Their software is Legacy of Egypt.

Jeff Silverman teaches computer-aided design in Fort Lauderdale, FL. His winning entry is a tutorial for novice computer drafting students. Visualizing the Third Dimension helps post-secondary students develop spatial reasoning and 3-D visualization skills.

Don Hall, a repeat contributor, is a technology director in Murfreesboro, TN. His article on human-computer interaction will be received well by everyone concerned with the value of multimedia technology in education.

Gregory MacKinnon, created a model for teaching pre-service teachers to use and explore a range of multimedia tools. His course, which is offered in Acadia University in Nova Scotia, Canada, is a pioneer multimedia offerings in a pre-service teacher education program.

The issue concludes with an index for volume 8. HN

Multimedia That Works:

Mixing Talent and Technology

MARK E. BROWN
AND
TRACY L. RILEY

KEYWORDS:
Project-based Learning, Multimedia Workshops, and Leadership and Gifted Students

WHEN A GROUP OF YOUNG, talented students are mixed with the right technology and given the task of creating electronic projects of great leaders you have multimedia that works! The multimedia experience described in this article demonstrates how of the potential of one of today's hottest educational technologies can be realized through the study of a too-often neglected content area. Although multimedia is frequently proclaimed to have great promise, the practical realities in the classroom does not always match the rhetoric. However, the combination of talent and technology through the study of "leadership" provides an exciting insight into the unleashed potential of multimedia. This article shows that making multimedia should not be restricted to the regular classroom; specialized out-of-school workshops offer gifted children an exceptional differentiated learning experience.

A series of *Computing for Clever Kids* workshops has been designed for 9- to 12-year-old gifted students as just one means of providing for the unique needs of these children (Riley & Brown, 1998). While many states and countries have yet to initiate a policy regarding the identification or provisions for gifted students, a number of schools and advocacy groups have devised programs. Olszweski-Kubilius (1997) reports that the demand for university-based programs for gifted children in North America is high. However, despite the level of interest there are few documented opportunities in the area of computing. By tapping into the expertise and resources within the largest teacher education provider in New Zealand, an innovative set of educational experiences has been developed.

The general aim of each computing workshop within the series is to foster innovative ideas via independent and group problem-solving. Moreover, to enhance individual talents and abilities both in learning to use computers and using computers to learn. Thus, The Magic of Multimedia workshop sets forth to fulfill this aim, using yet a different road map and vehicle. The article describes both the rationale and overall design of the workshop. It serves as a model for the use of multimedia as a learning tool in creating differentiated educational opportunities for gifted students.

THE GREAT LEADERS

Educators of the gifted have examined for many years the connections between giftedness and leadership. Beginning with Terman's classic 1925 study in which he concluded that gifted individuals were likely to be leaders, the unique parallels have surfaced. The growing number of leadership teaching models, theories, materials, and assessment instruments serve as evidence of the interest and understanding of these parallels (Riley & Karnes, 1994).

Leadership has been included in a number of definitions of giftedness, including those proposed in New Zealand. In 1986, the Department of Education stated that "children with special abilities (gifted and talented) are those who demonstrate high performance relative to their educational context in one or more of a wide range of areas such as... social skills and leadership" (cited in

McAlpine, 1996, p. 31). The inclusion of leadership among areas of talent or ability poses many challenges to educators.

Additionally, leadership as a topic of study may be seen as opening doors for students who either previously have not had leadership training nor been identified as having leadership characteristics. Providing gifted students with opportunities to learn about individuals who have contributed positively to society may not only broaden their knowledge of great people, but also enhance their experiential base. For these reasons the topic of "Great Leaders" has been chosen as the theme for this workshop.

THE PROJECT APPROACH

A project-based approach to learning is adopted in each of the workshops. This approach is unique in that it gives the learner an opportunity to explore a topic from their own view point. They are able to seek answers to their own questions and must decide on how to best utilize the available information. In keeping with contemporary learning theory, a project should typically involve an authentic learning experience that allows students a level of autonomy to pursue topics of interest in more depth (Guzdial, 1998). Ideally, a project should create a challenging and meaningful context where learning and instruction is scaffolded in a purposeful way.

The project approach, when used well, is an ideal enrichment experience for students with special abilities. Good projects used as enrichment opportunities fit within Renzulli's (1977) Enrichment Triad Model. The model has almost universal support by educators in the area (Riley, 1996). It provides a conceptual framework for teachers of the gifted to implement and evaluate project work. The multimedia workshop described in this article was informed by this model, and generally designed according to the project-based learning literature.

A range of projects were created in each workshop according to the different interests and tools of technology. Before the workshop the students are asked to research and collect background information, graphics, photographs, and audio and video clips about a great leader of their choice. For example, students in one workshop selected for study: Louisa May Alcott, Beethoven, Sir Edmond Hillary, Nelson Mandela, Napoleon, Roosevelt, Marilyn Waring, Whina Cooper, and Walt Disney. The leaders selected by students represent a wide range of disciplines and human endeavours, as well as a good balance of both gender and national and international leaders.

THE TECHNOLOGY

There are numerous computer applications that can enhance the education of gifted students. Knight and Knight (1994) outline the potential of computers in the education of the gifted, based largely on a continuum of learner control. When software is selected that affords high levels of control, students can develop their autonomy, creativity and problem solving abilities. This type of software is ideally suited to the creation of a knowledge-centered learning environment that meets the needs of gifted children.

Multimedia—the presentation of information through computers using a combination of media—can help to create a rich thinking environment. It presents the gifted student with many opportunities to develop a wide range of skills and understandings. It is important to acknowledge, nevertheless, that multimedia is nothing new; teachers have always sought ways to promote learning through a variety of media. However, by allowing children to combine these media within a non-linear product it is possible to create a powerful technology capable of challenging the way students think.

The key point is that the educational value of multimedia is not restricted to viewing someone else's efforts. Arguably, its real value is related to the type of learning processes students engage in as they research, design and build their own projects (Watson & Brown, 1996). In this regard, multimedia should not be seen as merely a presentation medium. It can provide a new means of expression that supports innovative approaches to teaching; for example, cooperative learning, thematic problem-solving and individualised project work. When multimedia is linked to innovative teaching strategies it can help students become more active in their own learning. Thus, the goal should be to establish active multimedia learning environments where students create and invent their own knowledge.

By students creating their own projects using multimedia software, such as HyperStudio, they are able to investigate and communicate their research findings in more creative ways. The advantage of multimedia is that a wider range of sources than merely traditional text can be integrated into the final product. Accordingly, the investigative process is potentially more demanding and there is greater scope for higher order thinking. Furthermore, when multimedia is used in accordance with contemporary educational theory it encourages social interaction which potentially enhances children's learning.

In our view, teachers have a clear choice; they can either focus on what commercially produced multimedia can do to gifted students, or what students can do with their own multimedia. The second choice recognises that the solution to learning does not lie with multimedia alone, but with the way that it is used in the learning environment. It would appear a waste of technology

for gifted students to passively navigate prepackaged commercial software when they can actively create their own multimedia projects on topics of interest. The latter is more likely to be challenging and rewarding, allowing students to express their own creativity and knowledge. In sum, there is every indication that student generated multimedia can extend gifted students in ways not possible via traditional forms of project work.

THE WORKSHOP

With an understanding of the rationale behind *Computing for Clever Kids*, this section outlines the nature of the multimedia workshop itself. The workshop is an all day experience held over the weekend, utilising a University computer lab equipped with 12 Macintosh Power PC computers. Students have their own computer terminal from which to work, thus allowing for individualization and encouraging autonomy. Using a simulation approach, each workshop begins with an invitation to join Massey University Leadership Images Production Services. Participants make applications for membership and introduce themselves stating their contribution to the team. The teachers, a specialist in educational technology and another in gifted education, also introduce themselves and their strengths of "talent and technology!"

The focus at this stage is clearly on a team supported by facilitators and the positive interactions that are expected during the day. Team members complete membership applications that query their qualifications, experiences, and special areas of interest. By describing themselves as individuals, the team becomes just that. . . one of unique individuals with different abilities and interests. This is an important concept for gifted children to understand, generally speaking, but also in regard to leadership characteristics. A healthy respect for one another is established early in the day as students describe their interests in computers, willingness to learn, anticipation of fun, and past experiences.

Following introductions, team members are familiarized with the concept of multimedia. Some hands-on experience is given using a range of hypermedia software. Then the students are introduced to the basic functioning of HyperStudio and shown how the software can be used to construct electronic projects. Leadership is introduced with a brainstorming activity of the qualities of great leaders. Finally, the students are given their task: to create a multimedia presentation of the leader of their choice. The task is described in Figure 1.

MASSEY UNIVERSITY
Leadership Images Production Services: Designer Task

Congratulations!

You have been selected as a designer on this team to create a multimedia presentation about one of a wide range of clients whom we serve. These clients are influential leaders... some are with us today, others have gone before us... but each has an image to portray. Your job is to reflect that image through the use of multimedia!

Your multimedia presentation should reflect the client's:

- leadership characteristics
- leadership skills
- outstanding achievements
- information you deem important to the individual's public image

In order to carry out these purposes you are asked to complete the following tasks over the course of the day:

- create a storyboard that demonstrates your plan for the presentation
- create the multimedia presentation itself using the company's standard format
- share your final product with an audience of peers and other potential future clients

Before starting, write a brief bio about yourself. Include:

- personal information: your name, age, and school
- experience
- qualifications
- what your contribution is to the team

Some of this information is available on your membership application. You also need to arrange for a photograph to be taken.

Good luck for a productive and exciting day!

Figure 1: The Multimedia Designer Task

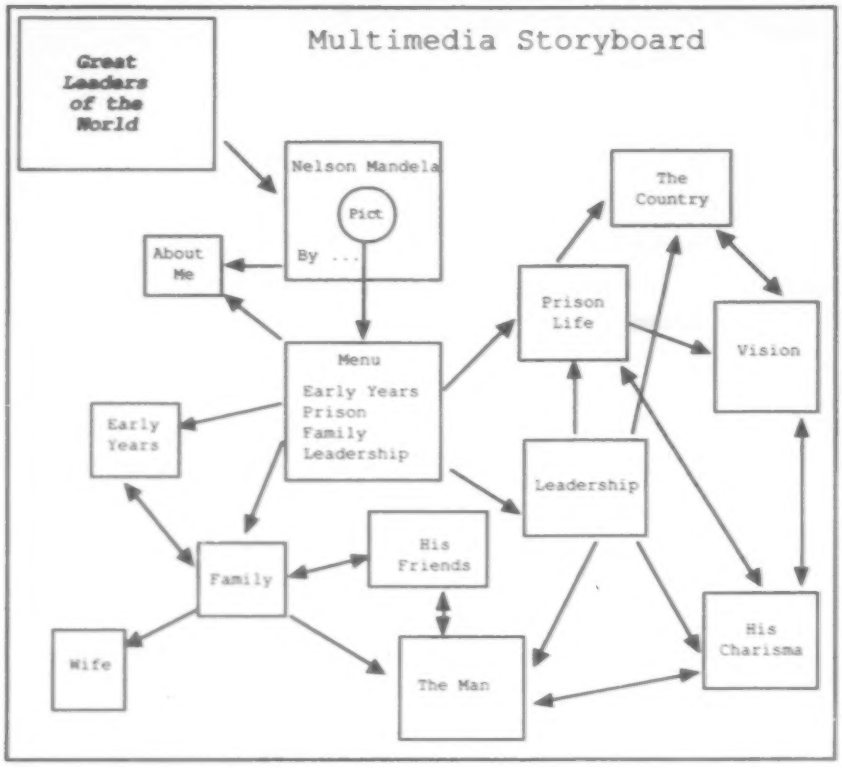

Figure 2: Sample Multimedia Storyboard

Planning the presentation is crucial and students are given two tools for this aspect of the project. The first is a brainstorming web on which they simply contemplate the contributions, qualities, and characteristics of the selected leader. Following the brainstorming, the students are required to create a storyboard of the way in which they intend to put together their individual electronic projects. This involves working out each of the individual pages, including layout and content. A sample storyboard can be seen in Figure 2. It demonstrates the level of planning required and why these storyboards are a critical factor in the ultimate success of the individual projects.

After feedback from the facilitators regarding their storyboards, students are on to the computers and the projects under way. Using a digital camera, a photograph of each student is taken and transferred to the student's computer for inclusion in their project. The students begin with the construction of a contents page and then dynamically link off from that page to other pages, based on their original plan. This allows the students to have control over the order in which they work and the way the projects are compiled.

Collaborative problem solving is encouraged in all aspects of the work leading to much sharing of knowledge between team members. The students who have participated become so intensely absorbed in their work that they have had to be strongly encouraged to break for lunch!

After lunch the students continue working on their projects. The students typically become highly engaged and remain on task throughout this period. The workshop facilitators are just that—most of the students work independently and rarely require adult help, except for some minor technical assistance. When the projects are sufficiently complete they are viewed by the rest of the team. This time for audience and peer feedback gives the students a chance to not only look at the final products, but also the opportunity to evaluate each other's work. Almost without exception the projects have been of very high quality. A sample project appears in Figure 3.

Once the projects are formally evaluated, the students come back together for a final discussion on the attributes and qualities of leaders. Working on the projects helps the students add to the original brainstormed list of leadership qualities as displayed in Table 1. This list and ensuing discussion show the depth with which the students think about their chosen leaders. A number of abstract characteristics and traits of great leaders are usually considered, and the day is capped off with a high level of analysis of leadership as a concept.

LEADERSHIP QUALITIES

Original List	Additional Qualities
cooperative	considerate of others
in charge	respect
special abilities	never give up
responsibilities	maturity
skills in a specific area	reliability
good temperament	trustworthy
achievements	hard working
unique	excel in an area
practice-work	concern
first to achieve	have vision
attitudes	delegate to others
persistence	sense of humour
sharing opinions	timing
working with people	knowledge
command skills	patience
decision making	work in spite of disability

Table 1: Leadership Qualities

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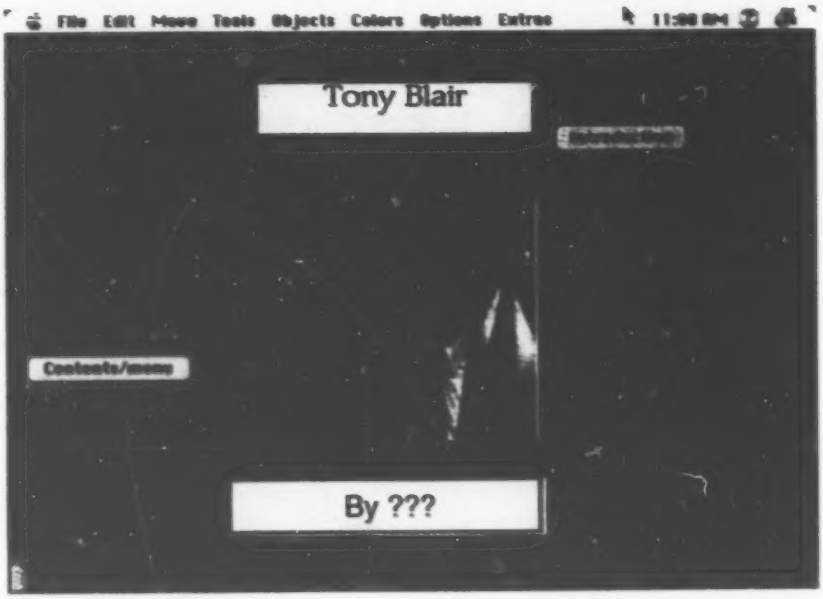

Figure 3: Sample Project

Finally, the students evaluate their own multimedia and professional skills using a performance scale similar to that described by Riley and Brown (1998). Parents and caregivers are given the opportunity to join the group, see the projects and give feedback to the participants. Students are keen to show off their new found skills and the adults are equally impressed with the completed multimedia projects. Finally, the students are given the opportunity to take home a video of their project as a lasting record of their achievement.

LESSONS IN TALENT AND TECHNOLOGY

The Magic of Multimedia workshop demonstrates that electronic projects designed by gifted students push their abilities toward the limit. Their enthusiasm and excitement coupled with meaningful content and "hot" technology result in the creation of professional-looking products. Differentiating content, process, product, and environment via multimedia are the elements of a magical experience for gifted children. In addition, the workshops give educators an opportunity to put theory into practice.

At the same time, the workshop poses another set of challenges through its lessons in talent and technology. Questions remain unanswered in regard to this combination and the workshop series have only touched the tip of the iceberg. For instance, what additional technology tools can be used in the design of educational programs for gifted students? Furthermore, how can those be best utilized?

The literature in this area is sparse, as evidenced by a smattering of documented programs. Troxclair, Stephens, Bennett and Karnes (1996) suggest the use of simulation programs, like the *Decisions, Decisions Series*. Some of these programs explore hard-hitting issues in an interactive multimedia environment. Riley and Brown (1997) have demonstrated the potential of *MicroWorlds Project Builder*, a Logo-based program. Westburg (1997) and Riley and Brown (1998) describe ways in which the Internet can serve as a base for technology experiences for gifted students. Benno (1998) states that "virtual reality has a lot of promise and applications" (p. 14). As computer technology rapidly advances, gifted educators will be saturated with possibilities—this is but the beginning.

Nearly 20 years ago, Dover (1983) predicted that gifted children would make the greatest contribution to the future of computers in education. Has this occurred? Or is this yet another hurdle for educators of gifted students? All indicators are that computer technology holds great promise for these unique students. By reporting and sharing what works, the technology challenge is being met.

The use of a multimedia package such as HyperStudio demonstrates potential, but also presents problems. Although the workshops are clearly successful, the technical demands are many, as students require photographs scanned, sound clips recorded, and the Internet accessed. One student suggested in his evaluation that the facilitators should "make the tools easier." The reality of using advanced technology to create professional-looking products is that while on one hand ease presents itself, on the other the tools can be complicated, time-consuming, and even baffling.

It is hardly surprising that such opportunities are not readily available in the classroom. Workshops like that described in this article are beyond the resources, both human and capitol, of many schools. Although an increasing number of teachers are developing both the "skill" and "will" for multimedia, there is still a high chance of failure. It is worth noting that often the success stories only are documented. One way around some of the frustration is open discussion with students of the potentialities and problems, as described by

Riley and Brown (1998). However, it remains to be seen whether multimedia production is feasible on a larger scale in the regular classroom.

A related challenge is time. Several participants have commented that "more time was needed." Having only one day in which to plan, research, and design a project has resulted in constraints for students. This is reflected not only in the frustration regarding technological demands, but also in the incompletion of some projects and lack of content depth in others. The workshop environment overcomes many of the problems associated with computing in schools, but even in this situation it would seem that students never have enough time. Advocates of both gifted education and educational technology need to heed this lesson alike.

A final challenge faced in New Zealand, as well as other parts of the world, has probably been best stated by a father of a participant. "This is great, but what happens on Monday?" Can schools without policies for gifted students support differentiated opportunities such as that described in this article? Are there sufficient resources readily available? Do teachers have the skills and knowledge to cater for children with special abilities generally speaking, let alone with a flair for computing? While the creation of the *Computing for Clever Kids* workshops fills a gap, it is only a first step toward meeting the needs of gifted children. The workshops should not be seen as an end in itself.

WHERE TO FROM HERE?

As with any new project, practice makes perfect! The experiences described in this article have resulted in multimedia projects that work, but further understanding is required of the untapped potential that educational technology offers gifted children. Students have created electronic projects of yesterday and today's great leaders while at the same time developing and contemplating the leaders of tomorrow—themselves. The mix of talent and technology may present more surprises for educators, but its a challenge worth taking. In the future, additional workshops are planned and more importantly a systematic research program will be put in place to investigate some of the issues raised in this article. HN

REFERENCES

Benno, M. (1998). Technology trends: Virtual reality. *Gifted Child Today, 21*(1), 12-14.

Decisions, Decisions Series [Computer Software]. (1986-1997). Watertown, MA: Tom Snyder Software.

Dover, A. (1983). Computers and gifted: Past, present, and future. In M. Lane, *Microcomputers and the gifted child* (pp. 79-82). Guilford, Connecticut: Special Learning Corp.

Guzdial, M. (1998). Technological support for project-based learning. In C. Dede (ed.), *Learning with technology* (pp. 47-71). Alexandria, Vir: ASCD.

Hyperstudio [Computer Software]. (1996). El Cajon, CA: Roger Wagner Publishing Inc.

Knight, B. A., & Knight, C. (1994). Computers in the classroom: Implications for gifted and talented students. *Australasian Journal of Gifted Education, 3*(1), 20 - 24.

McAlpine, D. (1996). The identification of children with special abilities. In D. McAlpine & R. Moltzen (eds.), *Gifted and talented: New Zealand perspectives* (pp. 63-90). Palmerston North: ERDC Press.

MicroWorlds Project Builder [Computer Software]. (1993-97). Highgate Springs, VT: Logo Computer Systems Inc.

Olszewski-Kubilius, P. (1997). Special summer and Saturday programs for gifted students. In N. Colangelo & G. Davis (eds.), *Handbook of gifted education* (pp. 180-189). Needham Heights, MA: Allyn & Bacon.

Riley, T. L., & Brown, M. E. (1998). Internet investigations: Solving mysteries on the information superhighway. *Gifted Child Today, 21*(1), 28-33.

Riley, T. L., & Brown, M. E. (1997). Computing for Clever Kids: The future is what we make it. *Gifted Child Today, 20*(5), 22-29.

Riley, T. L., & Karnes, F. A. (1994). Intellectually gifted elementary students' perceptions of leadership. *Perceptual and Motor Skills, 79*, 47-50.

Troxclair, D., Stephens, K., Bennett, T., & Karnes, F. (1996). Teaching technology: Multimedia presentations in the classroom. *Gifted Child Today, 19*(5), 34-47.

Watson, C., & Brown, M. E. (1996). *Whose reality; Opportunities and pitfalls in multimedia teaching?* Paper presented at Apple University Academic Consortium Conference, University of Queensland, Brisbane, Sept.

Westburg, K. (1997). Open the floodgates, harness the power of the Internet for students' independent projects. *Computers in New Zealand Schools, 9*(3), 23-27.

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Integrating the Internet in the Elementary Classroom

KEVIN ANDREYO

KEYWORDS:
WebQuests, Internet-based Curriculum and Instruction, and Classroom-based Distance Learning

AS MORE AND MORE SCHOOLS connect to the Internet, educators are seeking ways in which the Information Superhighway can be used to improve classroom instruction. One exciting way to enhance learning is curriculum-oriented WebQuests.

A WebQuest is an online version of a lesson plan or student activity with relevant resources hyperlinked from the WebQuest page. These pages are hosted on Web servers and universally accessed over the Internet, allowing teachers to share their ideas with students and other teachers around the globe.

Developed by Dodge (1995) and based on sound pedagogical principals, WebQuests effectively integrate the Internet into the curriculum while creating fun instructional activities that motivate students and educators alike. Since their inception educators have created hundreds and the numbers continue to increase. A quick search from any Internet search engine reveals an eclectic plethora of WebQuests for all grade levels.

The WebQuest model contains the following components. First, the Introduction component sets the stage, provides background information and defines relevance for the student. Next, the Task component describes what the student will have done when completed with the WebQuest. Then, the Process component breaks down the task component into short and clear directions. Additionally, a Resources component provides links to all of the items necessary to successfully complete the WebQuest. Resources used in a WebQuest, whether online or offline, are thoughtfully selected by the author to enrich the WebQuest experience and achieve the learning objectives. An Evaluation component evaluates the students understanding of the material. This component provides criteria for good performance that helps teachers and students understand the objectives of the lesson plan. Finally, the Conclusion component summarizes the learning experience, reflects on the process, and extends and generalizes what was learned—it provides closure. Together, these components constitute the framework for a WebQuest. It is a framework that provides a model for teachers to use in creating exciting online activities.

WebQuests work particularly well at the elementary level because they are structured so that students do not aimlessly surf the Internet, but instead focus on completing a series of tasks. By using hyperlinks, WebQuest authors direct students to specific resources needed to complete the activity. The hyperlinked resources are carefully selected to enrich the learning experience and achieve the learning objectives. As a result, younger students remain on-task. Another advantage of linking students to teacher-selected Internet resources is that these Web sites have been thoroughly screened thereby providing a "safer" environment for students' online activity.

An increasing number of educators are using WebQuests to provide interactive instruction for their students as well as students around the world. The continued growth of the WebQuest phenomena will ultimately lead to better utilization of the Internet in the classroom.

Undoubtedly, Dodge's work has inspired and enabled educators around the world to further develop methodologies for creating Internet integrated activities—developments that are being hailed as "a quiet revolution." (Classroom Connect, 1997) HN

Primary Level WebQuests

NMSU Student WebQuests
www-education.nmsu.edu:8001/webquest/examples.html

Curriculum Resources, Instructional Technology Development Consortium
http://itdc.sbcss.k12.ca.us.curriculum/webquest.html

Macomb Intermediate School District
www.macomb.k12.mi.us/wq/webqindx.htm

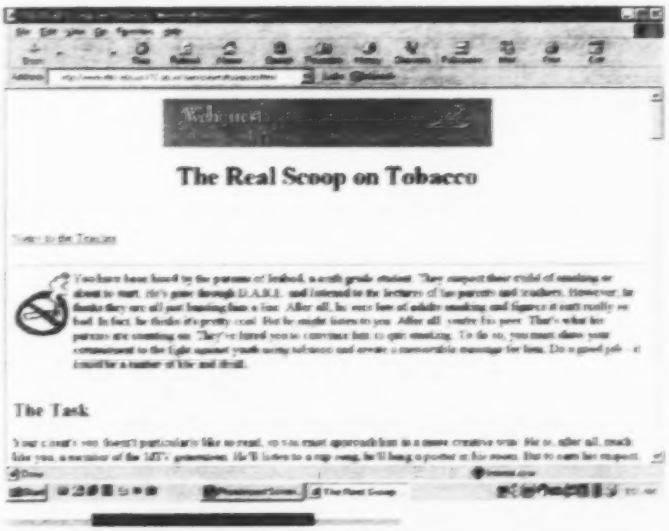
Bridgewater State College
http://topcat.bridgew.edu/~kschrock/ED560/ed560.htm

San Diego State University, EdWeb
http://edweb.sdsu.edu/webquest/matrix.html

Zelda's Zany Zoo (top)
www.itdc.sbcss.k12.ca.us/curriculum/zanyzoo.html

The Real Scoop on Tobacco (center)
www.itdc.sbcss.k12.ca.us/curriculum/tobacco.html

MusicLand Theme Park (bottom)
www.itdc.sbcss.k12.ca.us/curriculum/musicland.html



REFERENCES

Classroom Connect. (1995). Using WebQuests in the K-12 classroom. 1-6

Dodge, B. (February 1995). Some thoughts about WebQuests. Available: http://edweb.sdsu.edu/courses/edtec596/about_webquests.html. Downloaded on May 15, 1998. Last updated on May 5, 1997.

Dodge, B. (1995). WebQuest: A technique for Internet-Based learning. Distance Educator. 1(2), p. 10-13.

Dodge, B. (1997). Building blocks of a WebQuest. Available: http://edweb.sdsu.edu/people/bdodge/webquest/buildingblocks.html. Downloaded on February 6, 1998. Last updated on April 22, 1997.

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Legacy of Egypt

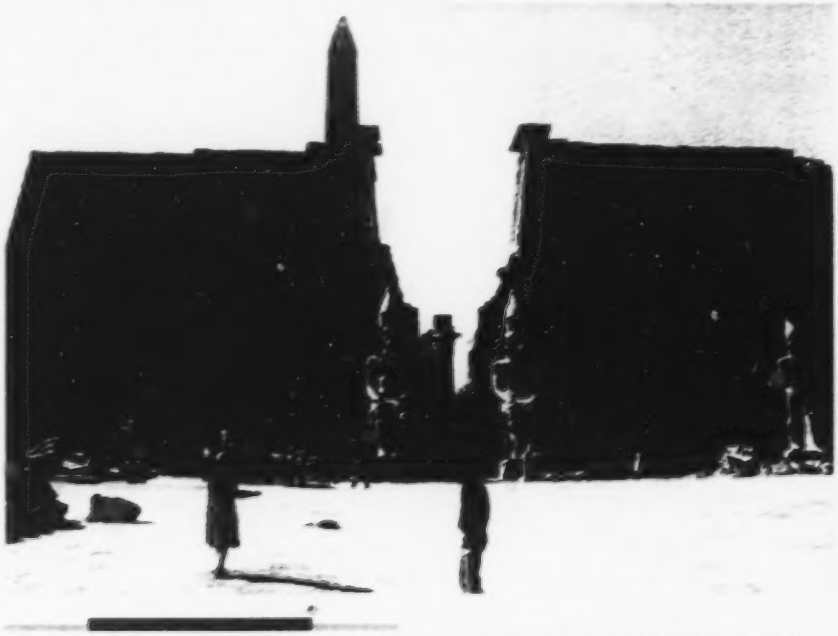
ED CORMANY, PING D'SOUZA, AND BRIAN SATORIUS

KEYWORDS:
Multimedia Projects, Authentic Assessment, and Collaborative Development

THE LEGACY OF EGYPT WAS produced under the direction of Adrian Geszler, computer education teacher at Woodbury Elementary School in Shaker Heights, OH. The CD-ROM disk was created with Apple Media Tools for the Mac 7.5.3 operating system. The authors were Ed Cormany, Ping D'Souza and Brian Satorius. Their sixth-grade classroom teachers who taught the content and were the subject matter experts were Louisa Matthias and Janet Hook.

This work was developed as part of the social studies/history curriculum. It attests to the students' mastery of the subject. The objective of the creation is to increase the user's knowledge of one of the world's greatest but often misunderstood civilizations, Egypt. The Legacy of Egypt is an example of the learning principle that one of the best ways to learn something is to teach it.

The judges of the NECC '97 *HyperNexus* Interactive Software Contest were extremely impressed with the quality of work and the intensity of effort that went into this production. The product serves as an example of using multimedia technology for authentic assessment of a learning experience. On this and the next page are sample screens from the application. For more information, call Adrian Geszler at 216-295-4160.



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WHEN MEMPHIS BECAME THE CAPITAL CITY OF RANCE A THIRD COSMOGONICAL SYSTEM EVOLVED THAT HAD THE CITY'S PRINCIPAL GOD, PTAH, AS THE CREATOR GOD. TO AVOID A DIRECT RUPTURE WITH THE PRIESTS OF HELIOPOLIS AND HERMOPOLIS, DEITIES FOR THE OTHER. TWO CREATION MYTHS WERE SAID TO BE CONTAINED WITHIN PTAH: ATUM, NUN, AND MAUNET (NOT SHOWN). PTAH CONCEIVED THE WORLD WITH HIS ACTIVE FACULTIES OF INTELLIGENCE IDENTIFIED WITH THE HEART AND PERSONIFIED BY HORUS AND WILL (PERSONIFIED BY THOTH AND IDENTIFIED WITH THE TONGUE) REPRESENTED BY ATUM. HE THEN CREATED EARTH BY HIS OWN WORD.

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Visualizing the Third Dimension

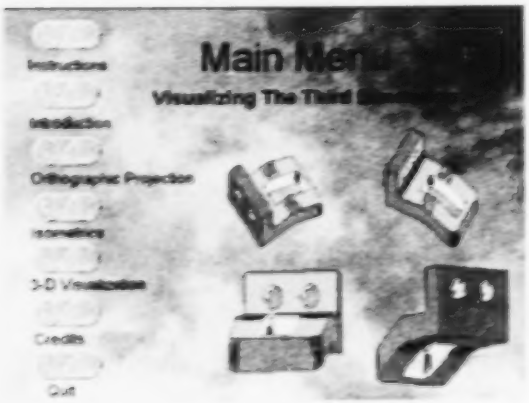
JEFFREY J. SILVERMAN

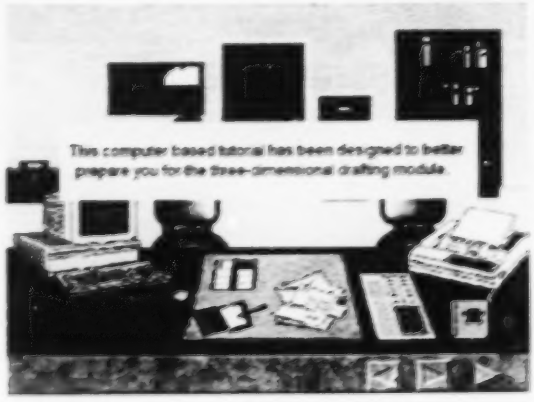
KEYWORDS:
3-D Drafting,
Spatial Reasoning,
and
Visualization Skills

VISUALIZING THE THIRD DIMENSION was written by Jeff Silverman using Authorware by Macromedia. A CD-ROM, it runs on the Windows 95 operating system. Jeff teaches in an associate degree program in computer-aided design and development (CADD). This product is intended to support existing learning resources.

The purpose of the tutorial is to improve students' spatial reasoning and visualization skills as well as their abilities to interpret two-dimension representations of objects and transform them into three-dimensional objects. The technical aspects of the CADD curriculum may be beyond the interest level of many of our readers. Nevertheless, the clarity of presentation and the human-computer interaction that may be seen through an examination of sample screen should be of interest to HyperSIG members.

This work impressed the judges of the NECC '97 *HyperNexus* Interactive Software Contest with its organization, screen design, and attention to detail. It is clear why an interactive computer-based tutorial is the best way to learn visualization skills. For more information, contact Jeff Silverman at 954-722-1150.





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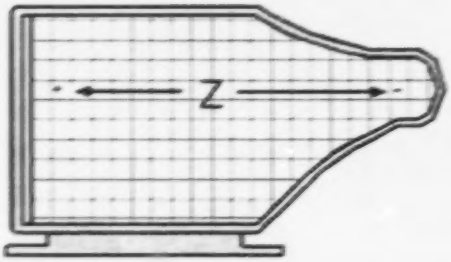
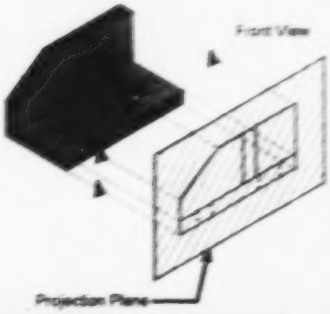
Computer graphics and geometric modeling have become one step in the integration of planning, designing, and manufacturing of a product into a continuous process.

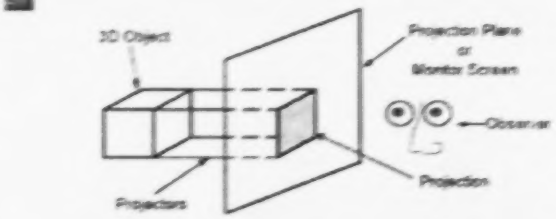
Freeform surface generation and solid modeling have expanded the use of *CAD/CAM* systems. New design and manufacturing methods are expected to continue this process well into the future.



Picture the Z axis as running deep back into your monitor.

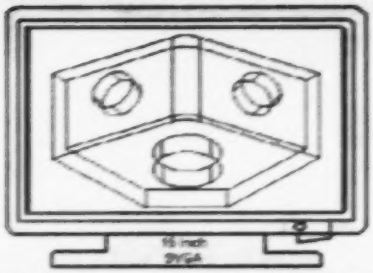
The views are projected perpendicularly on the faces of an imaginary transparent glass that surrounds the object.





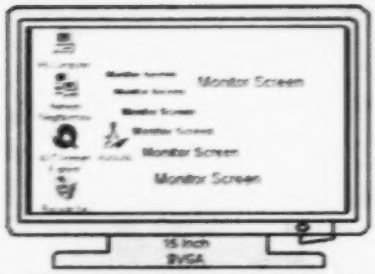
Similar to our 2D projection a viewing direction is established from the observer to the object by means of projector lines that cut through a plane where the projection appears.

Visualization is the process of recreating a three-dimensional image of an object in your own mind.

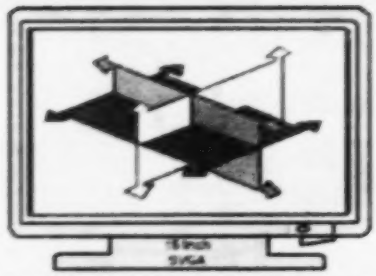


This is a simple 3D model seen in wireframe form. For easier viewing of models you will use two commands quite extensively. They are the HIDE command and the SHADE command

You must be able to visualize objects by using the evidence and clues provided by orthographic drawings or other pictorial presentations.



Your monitor screen is a flat two dimensional surface. In order to draw in three dimensions you must be able to visualize the screen in a "three-dimensional state of mind".



You should now have a pretty good idea of what 3D space is. It is an infinite area that you use to construct your models in. Visualizing this space, will make 3D drafting easy for you.

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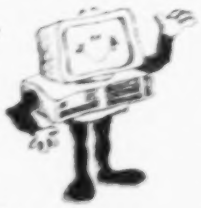
Interface Design: Facilitator or Foe?

DON HALL

KEYWORDS:
User-centered Design, Human Factors, and Systems That Work

The adage is quoted, "you cannot judge a book by its cover." Yet that very "cover," the user interface, often is the primary factor as to whether a computer program is successful or just another electronic paperback gathering dust on someone's shelf.



To many people this is what constitutes a "user-friendly" design. However, is the interface even really that important to the development of a successful interactive technology? Does the intended use of the artifact have any impact of the final interface itself? What elements make up a "user friendly design," and how do they impact the interface design? These are some of the issues to be addressed in this paper.

THE ROLE OF USER-CENTERED DESIGN

"Knowing your system users" and "recognizing their needs" are the first two steps in taking human factors into consideration during the system design. This approach is at the heart of the concept of "user-centered" design.

When an interaction is initiated between a user and a system, there are two forces at work. The user comes with goals for the interaction usually expressed in terms relevant to the person in psychological terms while the system's mechanisms and states are expressed in terms relative to it—its physical form. The discrepancy between psychological (gulf of evaluation) and physical variables (gulf of execution) creates the major issues that must be addressed in the design, analysis, and use of systems. (See Figure 1)

To bridge the gap between goals and system, there are only two ways to do this: Move the system closer to the user or move the user closer to the system. In a user-centered design approach, the system must be modified to accommo-

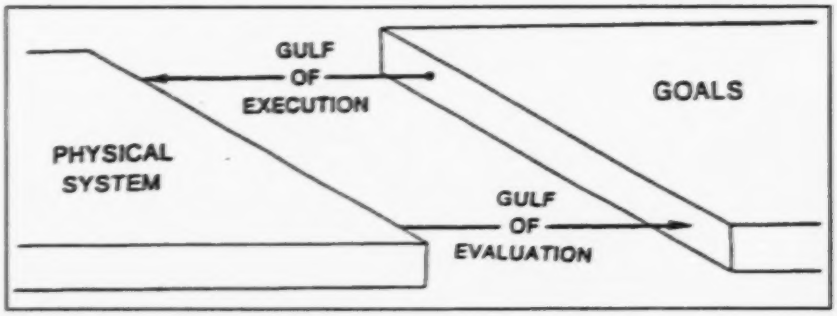


Figure 1

date the user. (Norman, pp. 38-43) Moving the system to the user means providing an interface that matches the user's needs, in a form that can be readily interpreted and manipulated by the user and still operate within the physical demands of the system. (See Figure 2)

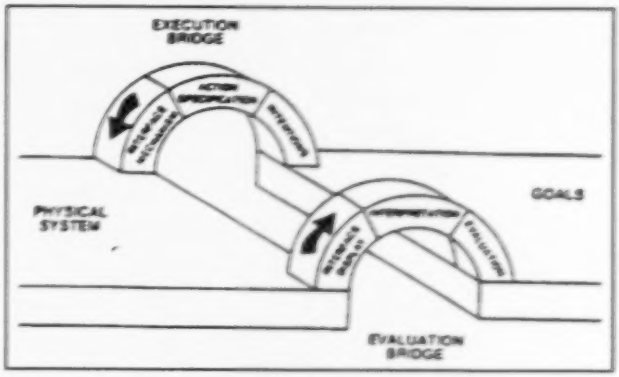


Figure 2

ELEMENTS OF EFFECTIVE INTERFACE DESIGN

Human factors matter because people must operate machines. If you fail to take people into account during interface design, then your machine (or system or program) may be difficult or impossible for people to operate. From the user's point of view, the interface is the system. The following design considerations are taken in part from Henry Simpson's work (1982) on "A Human Factors Guide to Program Design."

- ***Provide Feedback***—People need to know that actions they have taken have had an effect. If the user makes a keyboard entry or clicks the mouse, the program must respond to the user even if it is to tell the user "please wait" or an "hour glass" shows up on the screen. This prompting lets the user know if their "action" had a result on the program or even what their next action could or should be so they can begin to figure out how to interact with the system. The feedback should be immediate and obvious. The response message must be displayed prominently and in a consistent area. A poor example is the Countdown program. Although it was excellent for primary arithmetic instruction, the interface while glitzy did not provide adequate prompting or feedback for the user. (See Figure 3) The user just didn't seem to know what to do next or what they did wrong when something didn't work.

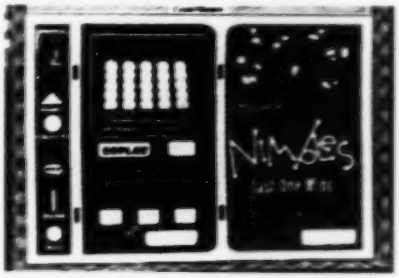


Figure 3: Opening screen for Countdown

- ***Be Consistent***—During the previous point, there was a mention about the need for the system's feedback response to be "displayed prominently and in a consistent area." The user must begin to predict accurately where the needed information will be displayed to avoid reaching the "frustration point" that could cause the interaction to cease. In addition, it is critical that as the user moves from one part of the program to another that there is a consistent feel to the operations, navigation, and functions. This issue can be addressed by establishing a set of informal rules that the programmer follows. These "rules" permit the operator to learn one part of the program's operation and then to apply the new knowledge to other parts of the program. Even something as simple as consistently using the "TAB" key or the "Return" to move from one data field to the next throughout the program can make it more desirable to the user.
- ***Minimize Human Memory Demands***—Because one of the primary strengths of the computer is its ability to store large volumes of information, use that ability to assist the user. Computers can remember "more" and "more accurately." When the user has to remember cryptic codes and command sequences, they again can reach the "frustration point" easily. The use of menus or other graphical interface elements can help diffuse this need by the user to remember large amounts of information in order to operate or navigate the program.
- ***Keep the Program Simple***—"Simplicity is an ideal that one strives to achieve by conscious design, by trial and modification, by cutting away the unnecessary, and by reorganizing and rearranging." (Simpson , 1982) This statement can more crudely but concisely by summarized as, "keep it simple, stupid." In system interface design, this premise is often neglected because of an interesting inverse benefit principle. In order for the program to be simpler for the user, the programmer must go to extra lengths and precautions to ensure this.

Figure 4: Decision screen from Broderbund's Living Books title, Just Grandma and Me

For example in the Broderbund Living Books series, decisions are very straight forward—"yes" or "no" (See Figure 4)—and are consistent throughout so that even the beginning level user feels comfortable with the program.

However, many companies are unwilling to spend the extra development time and money to allow this to occur because of perceived limited "benefit to cost ratios" for them. I say "perceived" because I have observed that if a program is easy and functional, then consumers will use this program and test others by that same company based on the reputation of that one. Case in point: the Broderbund success with Print Shop. This product allowed a "new company" to literally develop a strong market domination in academic or edu-tainment software by the reputation of this one program later followed by the popular Living Books series.

- ***Match the Program to the Operator's Skill Level***—As a designer, the intended audience must be clearly defined in regard to scope and skills levels. These factors should guide or at least be addressed during the system design phase. This can be effectively done by conducting a task analysis which defines the mission that the system must perform and what tasks are require to accomplish the functions. (supporting individual or cooperative activities) This can be illustrated by areas such as whether the program will require guided practice options, the sophistication of the help options, and the number of ways that information can be accessed and/or manipulated.
- ***Sustain Operator Orientation***—They say you have never been lost until you have been lost in cyberspace. The user must have concrete links as to where they are, where they have been, and how to get back there if desired. Good interface designs will keep the user "informed" as to their location within the program and how to move to other areas.

Techniques such as topical overview maps (an overview schematic of the program grouped by some logical arrangement) and decision paths (showing the user what choices they made to get there) are good ways to assist in the effort to show position within a system. For example, in the Turbo Gopher software used to access the Internet, the user can track their path by a chart of previously selected menu options. They can go back to any of those steps by merely reselecting that option from the path. It reminds me of "leaving the trail of bread crumbs" from the story of Hansel and Gretel so they could find their way home.

The use of title elements on a screen is critical to show the user where they are currently, but they must also know how to navigate to another area. Elements such as hyper or "hot" links, topical indexes, or just nested menus can be effective to assist users in moving through the program. The navigation tool's function and "way to be activated" need to be clearly understood by the user. Again this issue should be the challenge of the interface designer not the user. A good example of navigation by index is Microsoft's Musical Instruments (See Figure 5), which allows the user to explore freely by various categories (general topics, families of instruments, cul-

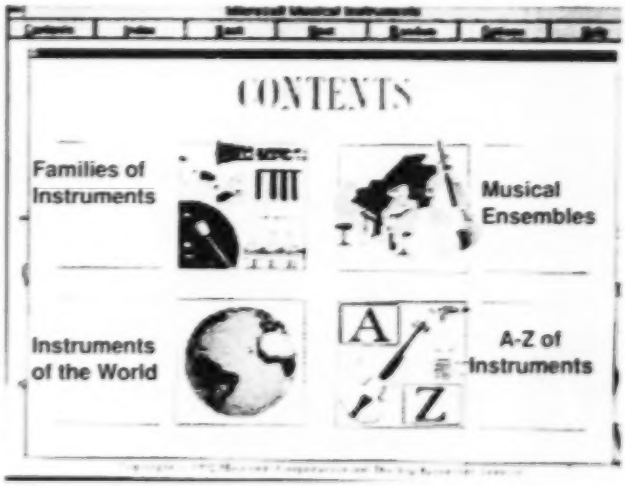


Figure 5: Microsoft Musical Instruments index screen

tural organizers,etc). When they are finished, the user returns to this starting screen to begin further explorations. This screen prepares the user for where they are going by providing context clues before they go and an expected returning point.

INTENDED USE AS A FACTOR IN INTERFACE DESIGN

Screen display is certainly a critical aspect of any interface as it is the window through which the user experiences their interaction with a system. However, it is only the surface aspect of complex behaviors or processes. For no matter how attractive a screen display is, an interface will not be effective unless the functionality is revealed through it (Hooper, p. 14) (aesthetic and ergonomic aspects). The challenge for software designers is to realize that the populace will be being doing different things with computers. This is very different from merely performing existing tasks more efficiently. They must anticipate these needs and changes in user demands. An understanding of human factors can allow a system to be designed to forecast change, and also address current needs.

You can decide in each case how important human factors are by looking at four different general aspects of your program (Simpson, 1982):

- the number of people who will operate your program
- the diversity of the operator's backgrounds
- the complexity of the program
- the consequences of operator error

Besides the factors listed above, the learning modes in which the program will be used are important also. I propose this approach can be addressed in part by the structural principles for instructional design discussed by Moore and Anderson (1969) as illustrated in Thomas Malone's article on *Intrinsic Motivation.*

- The *perspectives principle* suggests that learning is more rapid and deeper if the learner can approach the subject matter from as many as possible of the following perspective: agent, patient, reciprocator, and referee.
- The *autotelic principle* requires that, in general, the initial learning of complex skills be protected from serious consequences (such as prizes or physical dangers) so that it can be enjoyed for its own sake.
- The *productive principle* suggests that learning is more efficient in environments that are structured in such a way that students can make inferences about parts of the environment that they have not yet observed.
- The *personalization principle* includes the ideas that an environment should be both responsive to the learners' activities and helpful in letting them take a reflexive view of themselves.

CONCLUSION

Concern for the nature of the interaction and for the user are the things that should direct or drive the design of the interface. The final design is a collaborative effort among many different disciplines, trading off the virtues and deficits of many different design approaches. However, user-centered design emphasizes that the purpose of the system is to serve the user, not to use a specific technology or not to be an elegant piece of programming. The needs of the users should dominate the design of the interface, and the needs of the interface should dominate the design of the rest of the system. HN

REFERENCES

Hooper, Kristina, "User Centered Design", journal articles from *Multimedia Research and Design*, Fall 1994, pp. 9-16.

Malone, Thomas W., "Toward a Theory of Intrinsically Motivating Instruction", *Cognitive Science* 4 (1981), reprinted journal articles from *Multimedia Research and Design*, Fall 1994, pp. 69-72.

Norman, Donald A., "Cognitive Engineering", journal articles from *Multimedia Research and Design*, Fall 1994, pp. 38-43.

Simmons, Henry, (April 1982), "A Human-Factors Style Guide for Program Design", *BYTE*, reprinted journal articles from *Multimedia Research and Design*, Fall 1994, pp. 131-134.

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A Model for Teaching Multimedia Computer Applications in Teacher Education

ABSTRACT

In September of 1997, Acadia University became the first university in Canada to provide the unique electronic environment including IBM student laptops and cross-campus access to a computer network and the World Wide Web. This has allowed for many innovative applications of computers to the fully wired and technology equipped classrooms. In the School of Education at Acadia, this has presented many pedagogical challenges as well as opportunities to explore the enhancements that computers can offer (Niemi & Gooler, 1987; Massy & Zemsky, 1995; Padron & Waxman, 1996; Tosteson, 1996). Part of the technology enrichment at Acadia has allowed for the offering of a new course in the School of Education in the area of multimedia applications of computers. The framework for this course offering is posed here as an innovative approach. Students were polled in a survey to assess their attitudes toward the structure of the course, and the results and discussion are presented.

GREGORY MacKINNON

KEYWORDS:
Multimedia Skills for Teachers and Web-building Skills for Teachers

THE ELECTRONIC ENVIRONMENT

With IBM corporate support at Acadia University, approximately 1,400 students and 170 faculty have been equipped with Pentium 133 MHz laptop computers with 24 MB of RAM and 1.3 GB hard drives. As a result of extensive rewiring and hardware upgrade, faculty and students have cross-campus access to the Internet and a wide range of software applications on the computer network. Electronic classrooms have been assembled with features such as digital projection, videocassette recorders, opaque projectors, audio systems, and monitors that are all accessible through a modular laptop docking station. In addition, the School of Education has constructed a computer multimedia laboratory. The components of this lab are listed in Table 1.

MULTIMEDIA EQUIPMENT

- Five Touch PCs
- 166 MHz Pentium chip
- 3 GB hard drive, 32 MB RAM
- 8x CD-ROM
- Zip drives
- AWE64 sound cards
- Koss HDM/30speakers
- Two 3.5 floppy drives
- 17-inch ADI MicroScan monitors
- One (200MHz, 64MB RAM) Touch Pentium PC with video stream capture (Video Spigot)
- External Iomega Zip 100 drive
- Smart and Friendly CDR-4006 CD ROM burner (SCSI)
- HP Scanjet 4C Colour 32 bit scanner
- Canon BJC 4200-LX colour ink jet printer
- Midisoft MK-4902 MIDI controller keyboard
- Sony MVC-FD5 & Sony MVC-FD7 digital cameras
- Hitachi M262 & Sony SVO-1450 VCRs
- Hitachi VM-2500A & Panasonic AG190 video cameras
- Panasonic RQ2102 cassette recorder
- Macintosh Performa 5200 CD with
  - AGFA II SI colour scanner
  - HP 692c colour printer
  - External Iomega Zip 100 drive
- Panasonic 7500A/7510 Analogue Video Editing Suite

Table 1

THE COURSE FRAMEWORK

Schwier (1992) has suggested that students interact with computers at three distinct levels. The first of these levels he calls the "reactive" level where students respond to information stimuli. In the "proactive" second stage, the learner begins to construct knowledge. Finally, at the third level there exists "mutual levels of interactivity." The multimedia course described here is built around a similar model (Table 2).

PHASES OF INTERACTION

Phase I (on-going)

Students are introduced to particular pieces of hardware (digital cameras, scanners, etc.) in an instructor demonstration setting.

Phase II (6 weeks)

Students engage in a series of station-oriented tutorials designed to introduce a variety of multimedia software. Objectives are specific and group assessment is based on practical familiarity rather than content of individual tutorial products. Simultaneously, the students are responsible for readings that pertain to multimedia development (i.e., screen layouts, colour choices, feedback mechanisms, etc.). They are assessed on their familiarity with these readings.

Phase III (4 weeks)

Students in groups of three embark on an instructor-approved educational project that utilises the multimedia facilities. Students are responsible for presenting their final project work to their class in audio-visual presentation.

Table 2

Students in groups of three visited five independent stations and undertook tutorials on software culminating in the completion of a small application project. The application projects were added to a Zip disk and an electronic portfolio (Moersch & Fisher, 1995; Doty & Hillman, 1997; Jackson, 1997) was prepared. Individual application projects were presented by the group to the instructor and based on a supplied scoring rubric (Table 3), the group was evaluated.

TYPICAL POSITIVE SCORING RUBRIC FOR MULTIMEDIA TUTORIAL MODULE

1. Audio-Visual Content Requirements Fulfilled: scored to a maximum of three points (some, most, all)
2. Originality/Creative Use of Software & Hardware: scored to a maximum of three points (conventional, creative, innovative)
3. Organization & Presentation: scored to a maximum of three points (some structure, good planning, exceptional clarity)
4. Pedagogically Sound: scored to a maximum of one point

Total 10 marks per project.

Table 3

At the end of six weeks the group electronic portfolio was submitted and each student was required to write a short answer readings test based on the course text, "Practical Guidelines for Creating Instructional Multimedia Applications" (Fenrich, 1997). The software maintained at each station is outlined in Table 4.

TUTORIAL PROJECTS (PHASE II)

Individual tutorials at these stations required that students complete a small project. Considerable flexibility was allowed for in the topic students chose to demonstrate their competency at the station. This latitude was offered within certain frameworks that I will elaborate on here.

At the Hyperstudio station, students were expected to generate a tutorial on an elementary or secondary topic chosen from a list that included area and volume, parts of speech, classification of rocks, use of Venn diagrams, local historical figures, etc. Their work had to be 10 screens in length that included sound commentary, a video clip, a scanned picture, and background music.

At the Web site station, students were expected to generate a page of links for science, mathematics, social studies, or language arts. In these pages they were to embed sound, video, animated gifs, a variety of fonts and color, a frames approach, and digital photography.

The Powerpoint project was the most involved of all tutorial modules. A conscious decision was made in design to incorporate more applications at this station mainly because students were already very familiar with the Powerpoint application. In this project, students were expected to visit a school and collect video tape, digital photography, and audio interviews data. Students captured frames from their video

STATION SOFTWARE

Station #	Software
1	Hyperstudio (Macintosh)
2	Netscape Navigator Composer & HTML Assistant Pro 97
3	Powerpoint, Snappy Video Capture, Midisoft Studio, GryphonMorph, Sound Recorder, Cool 95
4	Authorware, Lview Pro, CorelDraw
5	Adobe Photoshop, VideoSpigot

Table 4

taping using Snappy. They used Morph to create an AVI file from individual digital pictures of students and used wave editing (Cool 95) to create wave files from their tape recorded interviews. Students also prepared their own MIDI music file using Midisoft studio and a keyboard. In their final school promotion product (10-15 slides in length), they included video, audio, animation, and non-linear hyperlinking between screens.

Students had a choice of famous poets, inventors, explorers, or artists as topics to demonstrate their ability to do simple software authoring using Authorware. Students were expected to use pictures and sound in their 10-frame presentations. At this station students were exposed to CD-ROM graphics, manipulation of image formats with LView Pro, and graphic modification with Corel Draw.

Adobe Photoshop allowed for students to do a project on graphics manipulation. In their tutorial product, they demonstrated layering effects, sizing and touch-up techniques, and picture modifications involving more than one scanned photograph. After a cartooning tutorial, students generated a hand-drawn cartoon that was scanned and then modified in Adobe Photoshop. They also had the option of preparing a textile graphic using speciality paper and appropriate settings on the color printer.

Having a familiarity with the accessible software and hardware, student groups prepared a one-page educational project proposal outlining their objectives and scope. Following some focused discussion with the instructor, they embarked on their major four-week project. It was imperative that stations were scheduled carefully and that students had ready access to the equipment outside of class time.

EVALUATION

The course was evaluated according to a scheme outlined in Table 5. Because evaluation was almost exclusively of the group effort, a 5% grade was allocated to assess the individual student's familiarity with projects. The format for presenting these items was an electronic portfolio contained on a group Zip disk. Individual students were also encouraged to develop a technology portfolio, which had as a component their experiences in this course.

STUDENT EVALUATION

Five Projects (each 10%)	50%
Content Test Based on Course Readings	15%
Major Application Project	20%
Application Project Presentation	10%
Individual Student Component	5%

Table 5

STUDENT SURVEY

Students (sample size=30) were posed a series of questions regarding the framework of the course. In each case they were to indicate whether they agreed (numerical value=1), were indifferent (nv=2), or disagreed (nv=3). Table 6 indicates the mean results of the survey.

MODIFICATIONS FOR NEXT TIME AROUND

Students overwhelmingly communicated that their favourite station incorporated Powerpoint, Snappy video capture, and Midisoft Studio. The majority of students found the Web page station most challenging and the Macintosh version of Hyperstudio most frustrating. In their comments about the course in general, students made the following suggestions: 1) include a desktop publishing station, 2) give students a choice as to which stations they might choose (e.g., four out of six), and 3) choose another means (rather than a test) of evaluating the theoretical underpinnings of the course.

STUDENTS PERCEPTION OF THE COURSE FRAMEWORK

Question	Mean Numerical Value
1. Working the tutorials at our own pace was better than being instructed step by step as a group.	1.2 (most agreed)
2. The scope of the software applications seemed to give a broad-based computer multimedia experience.	1.1 (most agreed)
3. Doing a mini-project after the tutorial helped us to practise what we had learned.	1.3 (most agreed)
4. Working in teams helped me to investigate the software in a less intimidating atmosphere.	1.6 (agreed-indifferent)
5. The text was useful as a resource for preparing our major application project.	2.4 (indifferent-disagreed)
6. We appreciated the opportunity to choose our own educational application project.	1.0 (all agreed)
7. I found the use of scoring rubics for evaluation clarified the professor's expectations of me in the course.	1.3 (most agreed)
8. The computer technology was frustrating to use and often unreliable.	2.4 (indifferent-disagreed)
9. The process of maintaining an electronic portfolio (on Zip disk) was a good class work organizer.	1.0 (all agreed)
10. There were opportunities to be creative in applying the technology.	1.2 (most agreed)
11. The workload was excessive for a 30-hour course.	1.8 (agreed-indifferent)
12. I was intimidated with the computer technology but gradually grew more comfortable.	2.2 (indifferent-disagreed)
13. I would say that overall the skills I have retained from this course could be useful in the public school setting.	1.3 (most agreed)
14. I would recommend that other students take this course.	1.3 (most agreed)

Table 6

CONCLUSIONS

More and more teacher education programs are including a multimedia course component. With limited resources available, many educators are seeking ways to maximise the efficiency of existing facilities. The modular model, outlined above, has the potential to give students a broad-based experience while allowing them to explore applications in their own project designs. In shorter time frames, the challenge remains to provide adequate theoretical foundations while maintaining a practical orientation in the course. Heads-on and hands-on is the ideal! HN

REFERENCES

Doty, L., & Hillman, C. (1997). Train preservice teachers in technology: A portfolio approach. *Technology and Teacher Education Annual*, 776-778.

Fenrich, P. (1997). *Practical guidelines for creating instructional multimedia applications*. Toronto, ON: The Dryden Press, HBJ Publishers.

Jackson, D. (1997). Developing student generated computer portfolios. *Technology and Teacher Education Annual*, 698-700.

Massy, W.F., & Zemsky, R. (1995). *Using information technology to enhance academic productivity*. Washington, DC: Educom.

Moersch, C., & Fisher, L. (1995, October). Electronic portfolios: Some pivotal questions. *Learning and Leading with Technology, 23*(2), 10-14.

Niemi, J.A., & Gooler, D.D. (Eds.). (1987). Technologies for learning outside the classroom. *New Directions for Continuing Education, 34*.

Padron, Y., & Waxman, H. (1996). The role of technology in improving mathematics and science for students in urban schools. In B.R. Bernard, J. Price, J. Willis, & D. Willis (Eds.), *Technology and Teacher Education Annual* (pp. 196-201). Charlottesville, VA: Association for the Advancement of Computing in Education.

Schwier, R. (1992). A taxonomy of interaction for instructional multimedia. Paper presented at the Annual Conference of the Association for Media and Technology, Vancouver, BC.

Tosteson, J. (1996). Information technologies and science education: Tools for synthesis, barriers to implementation. In B.R. Bernard, J. Price, J. Willis, & D. Willis (Eds.), *Technology and Teacher Education Annual* (pp. 274-280). Charlottesville, VA: Association for the Advancement of Computing in Education.

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